

TEXAS WORK GROUP ON BLOCKCHAIN MATTERS

2022 REPORT



A REPORT TO THE MEMBERS OF THE TEXAS LEGISLATURE

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Texas Work Group on Blockchain Matters

November 14, 2022

Dear Honorable Members of the Texas State Legislature:

In accordance with House Bill 1576, the Texas Work Group on Blockchain Matters hereby submits its report including recommendations for consideration by the Texas Legislature.

Respectfully submitted,

DocuSigned by:

DCBD48DCAAE8417
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DISCLAIMER

The Texas Work Group on Blockchain Matters was established by the 87th Texas Legislature to ensure a strategic statewide approach to enabling the blockchain industry in Texas. The Work Group's membership includes representatives from state agencies, universities in Texas, and private industry. The findings and recommendations in this report are those of the Texas Work Group on Blockchain Matters. This report was not authored by and does not necessarily reflect the views or opinions of the employers of any of the individual Work Group members.

The views and opinions expressed within this report reflect the perspectives of subject matter experts and do not reflect the position of a Texas state agency, nor does the participation of state employees in this report constitute an agency attempting to influence the passage of a legislative measure.

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EXECUTIVE SUMMARY

In the report that follows, the Work Group on Blockchain Matters (the “Work Group”) presents a general technology background, a review of terminology, the Work Group’s research as to the current state of the blockchain industry in Texas, the current state of educational and workforce initiatives that support the blockchain industry in Texas, and the research and rationale supporting the following twenty-one (21) legislative recommendations and four (4) additional recommendations for the adoption of resolutions on important policy matters made by the Work Group to the Texas Legislature (the “Legislature”), which are presented here in summary form for ease of reference:

Commercial Contracts

1. The Legislature should consider and enact the proposed 2022 Amendments to the Uniform Commercial Code (“UCC”) dealing with technological changes, including a new Article 12 and amendments to Article 9. These enactments will give full legal recognition to digital assets as a type of personal property and will protect such traditional property rights as the right to own free and clear of conflicting property claims, the right to assign as collateral for obligations, and the right to sell.
2. To avoid creating ambiguity in the emerging blockchain marketplace in Texas, the Legislature should not supplement or attempt to clarify Texas’s earlier enactment of the Uniform Electronic Transaction Act, which gives full legal recognition to electronic records, electronic signatures, and the use of automation to complete transactions electronically.

Digital Identity

3. Texas should incentivize technology companies whose revenue model does not depend on the monetization of personal data—or whose revenue model actively precludes such data monetization—to headquarter in Texas. The Legislature should further study the best incentivization model to achieve this purpose.
4. The Work Group encourages the Legislature to adopt a resolution affirming the importance of exploring a framework for self-sovereign identity (“SSI”) that would allow individuals to custody data about themselves and decide when, how, and with whom that data is shared.
5. The Work Group encourages the Legislature to adopt a resolution affirming the right of Texas citizens to possess cryptocurrency on their own account, and to not be prohibited from the use of what is commonly, if inaptly, referred to as “self-hosted wallets,” and to affirm the intention of Texas to protect producers of “self-hosted wallet” software or platforms and their users from undue interference.

DAOs

6. The Legislature should clarify business enterprise law to ensure Decentralized Autonomous Organizations (“DAOs”) enjoy a full range of business entity formation options and are not limited to a single option (in other words, Texas should not create, for example, a specialized version of the Limited Liability Company (“LLC”)).

7. The Legislature should consider amending the Business Organizations Code § 101.001(1) to clarify that a company agreement of a limited liability company is not unenforceable merely because part or all of the agreement is written in computer code.
8. The Legislature should consider amending Business Organizations Code § 6.002 to clarify that “another suitable electronic communications system” may include an “electronic data system” (Business Organizations Code § 1.001 (20-a)) alone or in combination with the other technologies listed in that section for the purposes of holding meetings and voting.

Education

9. Texas should create more robust privacy protections for student data, clear disclosures of the practices of data collectors and processors, and a reasonable range of opt-out rights, including prioritizing student and parent ownership of data.
10. In order to ensure maximum privacy of student data and to ensure the prioritization of student and parent ownership of said data, Texas should encourage education technology providers to use open technology standards for student records.
11. The Work Group encourages the Legislature to adopt a resolution supporting educational initiatives related to blockchain technology.

Energy

12. Texas should create a severance tax abatement for natural gas that was once flared but is now being consumed on-site.
13. Texas should incentivize controllable loads like bitcoin mining by lessening the tax burden on the purchase of electricity when it is used to power a bitcoin mine or other large flexible load that participates in ancillary services with the Electric Reliability Council of Texas (“ERCOT”) (as a controllable load or interruptible load). We recommend that this tax incentive be given under the condition that a large flexible load, like a bitcoin miner, participates in a new load category within ERCOT called the large flexible load category or they voluntarily agree to curtail their power usage anytime physical responsive capacity (“PRC”) dips to 3,000 MW PRC.

Finance

14. Texas should institute two-year retail sales “tax holiday” for direct cryptocurrency point-of-sale payments for products and services, subject to a reasonable value cap.
15. The Legislature should consider codifying established cryptocurrencies with a large market cap, such as bitcoin, as an authorized investment¹ for the State of Texas.
16. Texas should take steps necessary to make clear to the public that under existing law operating a Lightning Network node does not make an entity or individual a money services business in Texas. This should be accomplished either by an appropriate Texas regulator issuing a public statement or by enacting legislation.

¹ TEX. GOV'T CODE § 404.024.

17. The Legislature should consider appropriate consumer protection related to different cryptocurrency lending models. The Legislature should coordinate with the Texas Congressional Delegation to ensure that regulation at the federal level similarly differentiates between the risk profiles of the different lending models currently offered.
18. Texas should create a statutory definition of a fully U.S. dollar-backed, audited stablecoin that has the status of “money” for all purposes, including, but not limited to, for permissible investments, under the Texas Money Services Act.
19. The Work Group calls attention to the potential dangers of the creation of a retail Central Bank Digital Currency (“CBDC”)—e.g., a CBDC that involves a direct relationship between the Federal Reserve and consumers—in the United States, and encourages the Legislature to coordinate with the Texas Congressional Delegation to oppose such attempts.

Government

20. The Legislature should direct state agencies with subject-matter expertise to develop best practices or guidance related to finances and leveraging blockchain technology infrastructure. Best practices could include defining blockchain benefits, use cases, contractual language, development of a blockchain innovation and/or center of excellence, and education or curriculum development.
21. The Legislature should direct the Department of Information Resources (“DIR”) to develop a decision model to assist agencies in deciding if blockchain technology is appropriate for infrastructure consideration. Using a decision model to assist the use-case selection process will save time and focus efforts on use cases that provide the greatest value to the organization.
22. The Legislature should consider establishing an innovation center within DIR or an independent organization as a Private-Public partnership.

Official Record Keeping Systems

23. Texas should encourage counties to consider piloting the integration of blockchain technology in the existing land registry system and solicit an RFX (e.g., Request for Proposal (“RFP”), Request for Offer (“RFO”), etc.) on the use of blockchain technology to support storage of real property records.
24. To the extent that blockchain technology may lower costs and create efficiencies in real estate transactions and title research, Texas should encourage private actors such as title insurers to adopt new technologies.
25. Texas should consider whether to use a blockchain-based data-management system for UCC Financing Statements, and in connection with adopting such a system, should consider the elimination of paper filings.

TEXAS WORK GROUP ON BLOCKCHAIN MATTERS CHARGES

The 87th Texas Legislature passed [House Bill 1576](#) creating a workgroup on blockchain matters concerning Texas. The bill, authored by State Representative Tan Parker, directed the Work Group to “develop a master plan for the expansion of the blockchain industry in this state and recommend policies and state investments in connection with blockchain technology,” and required a report including the master plan and any findings or recommendations be submitted to the Legislature. This report is submitted in compliance with the requirements of HB 1576.

In developing the master plan, the bill required the 16-member work group to:

- (1) identify economic growth and development opportunities presented by blockchain technology;
- (2) assess the existing blockchain industry in this state;
- (3) review workforce needs and academic programs required to build blockchain expertise across all relevant industries; and
- (4) make any legislative recommendations that will help promote innovation and economic growth by reducing barriers to and expediting the expansion of the state’s blockchain industry based on its findings.

HB 1576 authorized the Work Group to form subcommittees and consult subject matter experts to develop the master plan and recommendations. The work group divided into subcommittees focused on the following areas of study: commercial contracts, digital identity, DAOs, education, energy, finance, government, and official record keeping. This report contains the findings and recommendations of the Work Group, having considered and deliberated over the research and work of those subcommittees, as part of the development of the master plan.

The master plan provides twenty-one (21) legislative recommendations and four (4) additional recommendations for the adoption of resolutions on important policy matters to establish Texas as a leader in the blockchain technology and cryptocurrency space by:

- Encouraging economic growth in Texas, including growth of existing companies and formation of new companies in Texas;
- Creating new jobs in Texas; and
- Establishing regulatory and legal clarity in key areas.

A (VERY SHORT) TECHNOLOGY PRIMER

When mining the Bitcoin Blockchain genesis block in 2009, Satoshi Nakamoto ushered in the era of blockchain technology.² Satoshi Nakamoto introduced Bitcoin's Blockchain as a digital ledger of transactions distributed across an adversarial network in which it is computationally impractical for any party or group to retroactively modify the ledger.³ The redundant nature of the Bitcoin Blockchain solved a long-standing problem in computer science: the double-spend problem, in which someone might copy digital currency tokens or claim ownership of digital currency tokens that are not theirs.⁴ By using a distributed ledger, digital signatures, cryptographic pointers, and fixing the number of total bitcoin tokens, Nakamoto achieved three major objectives:

- 1) Making control of every token (and its subdivisions) cryptographically demonstrable and effectively unforgeable;
- 2) Enabling direct peer-to-peer financial transactions without a third-party intermediary; and
- 3) Preventing artificial inflation in the value of bitcoin tokens through arbitrary token issuance.⁵

Blockchain technology is often described as one type of distributed database known broadly as distributed ledger technology ("DLT").⁶ Although commonly used interchangeably with DLT, the term blockchain technology more precisely refers to a sub-set of DLT protocols that structure their data in a literal "chain of blocks" by linking blocks of validated transactions together using one-way cryptographic hashes.⁷ However, blockchain technology is a protocol technology.⁸ A protocol is "a set of instructions for the compilation and interaction of objects."⁹ Generally, a "network protocol" simply sets the rules that allow networked computers (nodes) to communicate with each other.¹⁰ "A blockchain protocol, for its part, sets the rules that enable networked computers to track

² See SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2009), *available at* <https://bitcoin.org/bitcoin.pdf> ("In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions."); Brynne Harder, *A Cryptocurrency Primer: Understanding Crypto and Its Rise*, ECONOMY FISCAL NOTES (Aug. 2022), *available at* <https://comptroller.texas.gov/economy/fiscal-notes/2022/aug/crypto-primer.php> ("In 2009, Satoshi Nakamoto wrote a software program that created the Bitcoin network (with an uppercase B) and the digital cryptocurrency, bitcoin (with a lower case b).").

³ NAKAMOTO, *supra* note 2, at 8 ("[W]e proposed a peer-to-peer network using proof-of-work to record a public history of transactions that quickly becomes computationally impractical for an attacker to change if honest nodes control a majority of CPU power.").

⁴ *Id.* at 2.

⁵ *Id.* at 1

⁶ GARRICK HILEMAN & MICHEL RAUCHS, GLOBAL BLOCKCHAIN BENCHMARKING STUDY 11 (2017), <https://perma.cc/R4K4-REKN> (PDF).

⁷ *Id.*

⁸ See Carla L. Reyes, *(Un)Corporate Crypto-Governance*, 88 FORDHAM L. REV. 1875, 1895 (2020).

⁹ ALEXANDER GALLOWAY, PROTOCOL: HOW CONTROL EXISTS AFTER DECENTRALIZATION 75 (2004).

¹⁰ Will Warren, *The Difference Between App Coins and Protocol Tokens*, MEDIUM: 0x Blog (Feb. 2, 2017), <https://blog.0xproject.com/the-difference-between-app-coins-and-protocol-tokens-7281a428348c>.

transitions in the global state of recorded data without a centralized third-party intermediary.”¹¹ A significant portion of these rules relate to the consensus mechanism used to validate transactions. There are a variety of such consensus mechanisms,¹² but the two most prominent are known as proof-of-work and proof-of-stake.

Proof-of-work is a system in which network participants can validate transactions and compete to create a new block of validated transaction data without permission in a decentralized network.¹³ The cryptographic proofs that participants provide to the entire network prove that they had to do considerable work to create that legitimate new block in the blockchain.¹⁴ Bitcoin has run successfully for nearly fourteen years using proof-of-work consensus. Bitcoin will likely not depart from proof-of-work and cannot be forced to do so. The network is decentralized: miners produce bitcoin globally, and private node operators secure the network, running easy-to-install private nodes on their computers and tiny, inexpensive commodity hardware.¹⁵ Specifically, miners conduct four checks on transactions in the Bitcoin Blockchain: transaction validation—confirming that: the transaction is valid with the current blockchain; the output being redeemed has not already been spent; whether to relay a transaction; and the script is a whitelisted script.¹⁶ Notably, making changes to the protocol rules requires an extremely difficult, consensus-driven process, which increases its legitimacy, predictability, and reliability.¹⁷ If the global community does not largely support any proposed changes, the blocks will get rejected and the individual miner shunned from the network.¹⁸

Proof-of-stake was conceived as an alternative consensus mechanism to proof-of-work wherein the validators of transactions on a network put some assets at risk for the privilege of being able to validate transactions and create new blocks of validated transactions in the blockchain.¹⁹ The protocol randomly chooses one miner to validate the transaction and update the blockchain and, like in proof-of-work, the validator receives cryptocurrency in exchange.²⁰ If the validator turns

¹¹ Carla L. Reyes, *Creating Cryptolaw for the Uniform Commercial Code*, 78 WASH. & LEE L. REV. 1521, 1538 (2021).

¹² For example, a variety of consensus mechanisms beyond proof-of-work and proof-of-stake exist. Ripple and Stellar use “a unique node list of at least one hundred nodes they can trust in voting on the state of affairs.” DON TAPSCOTT & ALEX TAPSCOTT, *BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN AND OTHER CRYPTOCURRENCIES IS CHANGING THE WORLD* 32 (2016) (emphasis omitted). Other consensus mechanisms include proof of activity, proof of capacity, and proof of storage. *Id.*

¹³ Benjamin Curry, *Proof of Work Explained*, FORBES (Apr. 8, 2022, 3:06 PM) <https://www.forbes.com/advisor/investing/cryptocurrency/proof-of-work/>.

¹⁴ NAKAMOTO, *supra* note 2, at 3 (“Once the CPU effort has been expended to make it satisfy the proof-of-work, the block cannot be changed without redoing the work.”).

¹⁵ ARVIND NARAYANAN ET AL., *BITCOIN AND CRYPTOCURRENCY TECHNOLOGIES: A COMPREHENSIVE INTRODUCTION* 28-29 (2016).

¹⁶ *Id.* at 67.

¹⁷ See generally, Raina S. Haque, Rodrigo SeiraSilva-Herzog, Brent A. Plummer, & Nelson M. Rosario, *Blockchain Development and Fiduciary Duty*, 2 STAN. J. BLOCKCHAIN L. & POL’Y 139 (2019).

¹⁸ Primavera De Filippi & Benjamin Loveluck, *The Invisible Politics of Bitcoin: Governance Crisis of a Decentralised Infrastructure*, INTERNET POL’Y REV. 1, 6 (Sept. 2016).

¹⁹ Cong T. Nguyen, et. al., *Proof-of-Stake Consensus Mechanisms for Future Blockchain Networks: Fundamentals, Applications and Opportunities*, 7 IEEE Access 85730 (2019)

²⁰ *Id.* at 85732.

out to be offline or validates invalid information, his staked funds will be “slashed” as a penalty.²¹ This creates the incentive to behave properly on the network.²² The reward in this system typically allows the validator to have a better chance of validating a transaction data block depending on how much of the native asset they own and have at stake.²³ The advantage posed by proof-of-stake networks is that they can maximize speed and efficiency with lower fees.²⁴ Proponents of proof-of-stake systems also typically cite lower energy consumption needs compared to that of proof-of-work as a primary rationale for making the choice.²⁵ This is a primary reason why the Ethereum protocol, which has historically been based on proof-of-work, undertook a long process to switch to a proof-of-stake system, culminating in “The Merge” on September 15, 2022.²⁶ Many other competitor networks to Ethereum are already proof-of-stake.²⁷ However, critics say that proof-of-stake consensus can be more centralized than proof-of-work because it requires significant upfront financial investment and technical knowledge.²⁸ For example, in Ethereum 2.0 the minimum staking requirement to become a miner is 32 ETH.²⁹ The other alternative for users to participate in proof-of-stake networks is to deposit a smaller amount of cryptocurrency into a staking-as-a-service provider that runs the technical validation operations for a fee.³⁰

Other major protocols exist to solve issues specific to enterprises. For example, Hyperledger is an open-source project commonly used in enterprise blockchain because it comes with libraries helpful for development and is compatible with Linux, an operating system used widely in business.³¹ In addition, a business may choose to implement the Multichain protocol if it is creating a private blockchain network focused on efficient transactions and working with traditional finance, such as fiat currencies and physical stores of value.³² Each protocol, whether open-sourced and public or permissioned and designed for a specific enterprise, comes with different strengths and weaknesses that make them suited for different enterprise purposes. “The common theme among all the blockchain protocols, despite their technical differences and different consensus mechanisms, is that, at base, blockchain protocols share a core attribute: they track transitions in

²¹ *Id.*

²² *Id.*

²³ *Id.* at 85730-85732.

²⁴ *Id.*; see also *What is “Proof of Work” or “Proof of Stake”?*, COINBASE, <https://www.coinbase.com/learn/crypto-basics/what-is-proof-of-work-or-proof-of-stake> (last visited Nov. 5, 2022).

²⁵ Nguyen, *supra* note 19, at 85731.

²⁶ Elie Kapengut & Bruce Mizrach, *An Event Study of the Ethereum Transition to Proof-of-Stake*, arXiv:2210.13655v1, at 1 (2022), <https://doi.org/10.48550/arXiv.2210.13655>.

²⁷ Examples include: Oroboros, Chains-of-Activity, Algorand, and Tendermint. Nguyen, *supra* note 19, at 87532-87534.

²⁸ Muhammad Saad, et. al., *e-POS: Making Proof-of-Stake Decentralized and Fair*, 32 IEEE TRANSACTIONS ON PARALLEL & DISTRIBUTED SYS. 1961 (2021).

²⁹ Rahul Nambiampurath, *Did Ethereum Become Centralized Post The Merge?*, IB TIMES (Nov. 4, 2022 5:10 A.M.), <https://www.ibtimes.com/did-ethereum-become-centralized-post-merge-3631096>.

³⁰ Sage D. Young, *Will a Proof-of-Stake Ethereum Lead to More Centralization?*, CoinDesk (May 18, 2022), <https://www.coindesk.com/layer2/2022/05/18/will-a-proof-of-stake-ethereum-lead-to-more-centralization/>.

³¹ William Dawsey, *5 Key Blockchain Protocols You Need to Know*, CHETU, <https://www.chetu.com/blogs/blockchain/5-key-blockchain-protocols-you-need-to-know.php> (last visited Nov. 5, 2022).

³² For more information on Multichain, see <https://multichain.org/> (last visited Nov. 5, 2022).

state in order to allow participants in the network to reach agreement about the existence and evolution of shared facts.”³³

Some blockchain protocols allow users to build computer programs that operate at a second layer of the technology stack.³⁴ One such computer program is a smart contract.³⁵ Like the variance among implementations of DLTs and blockchain protocols, the precise implementation of a smart contract can vary significantly.³⁶ At base, however, a smart contract is very similar to a “persistent script”³⁷—a standing computer program—that says “if data is received that X has occurred, Y will execute.”³⁸ However, smart contracts are quite passive.³⁹ Smart contracts cannot reach out to find data evidencing an event, “x,” has occurred.⁴⁰ Rather, the smart contract must be triggered, i.e., sent a signal that an event, “x,” has occurred.⁴¹ The signal that triggers execution of the smart contract, certifying that “x” has occurred, can be internal to the blockchain (i.e., coming from other smart contracts), or the smart contract can receive the signal, and the data specific to it, from an outside source.⁴² In smart contracts, the word contract is not used in the legal sense of legally enforceable contract. Rather, smart contracts encompass a far greater range of computer programs running on blockchain technology.⁴³ The frequent debate around legal enforceability of smart contracts illustrates, however, another key element of any blockchain technology primer—a discussion of terminology.

³³ Reyes, *supra* note 11, at 1540 (citing Peter Van Valkenburgh, *What’s a Blockchain, Anyway?*, COIN CTR. (Apr. 25, 2017), <https://www.coincenter.org/education/blockchain-101/whats-a-blockchain/>).

³⁴ Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 333 (2017).

³⁵ HENNING DIEDRICH, ETHEREUM: BLOCKCHAINS, DIGITAL ASSETS, SMART CONTRACTS, DECENTRALIZED AUTONOMOUS ORGANIZATIONS 167 (2016).

³⁶ Reyes, *supra* note 11, at 1541.

³⁷ DIEDRICH, *supra* note 35, at 176 (“In Ethereum, ‘smart contract’ often just means ‘a Solidity script.’”); ANDREAS M. ANTONOPOULOS & GAVIN WOOD, MASTERING ETHEREUM: BUILDING SMART CONTRACTS AND DAPPS 127 (2018).

³⁸ Richard Gendal Brown, *A Simple Model for Smart Contracts* (Feb. 10, 2015), <https://gendal.me/2015/02/10/a-simple-model-for-smart-contracts/>.

³⁹ ANTONOPOULOS & WOOD, *supra* note 37, at 128-29.

⁴⁰ *Id.* at 129 (“Contracts never run ‘on their own’ or ‘in the background.’”).

⁴¹ *Id.* (“Contracts effectively lie dormant until a transaction triggers execution, either directly or indirectly as part of a chain or contract calls.”).

⁴² DIEDRICH, *supra* note 35, at 167-70.

⁴³ *Id.* at 168-74.

A (VERY SHORT) NOTE ON TERMINOLOGY

Those building blockchain technology and cryptocurrency, law and policy-makers, and the general public often use a variety of words interchangeably to discuss very different elements of the blockchain ecosystem.⁴⁴ For example, the term cryptocurrency, or the term cryptoassets, is often used as a catch-all term to refer to anything transferred via a DLT or blockchain protocol. However, technologists do not really use the term “cryptoassets”⁴⁵ and the nature of the many different classes of cryptocurrency vary significantly.⁴⁶ Indeed, the blockchain industry tends to use different labels for different classes of cryptocurrency, and the names chosen reflect both technical differences and values of the communities that use the assets.⁴⁷

If cryptocurrency is the broad catch-all term, “native cryptocurrency” or “intrinsic cryptocurrency” refers to those classes of cryptocurrency that serve both as a medium of exchange and as a security feature of the protocol.⁴⁸ Examples of such intrinsic cryptocurrency include bitcoin and ether. For example, bitcoin serves a security function in the Bitcoin Blockchain as part of the proof-of-work system discussed above.⁴⁹ The term “token” usually refers to an asset that sits at the second layer of the technology stack, often created via smart contract.⁵⁰ A Non-Fungible-Token (“NFT”) is a specific type of token—an asset that sits at the second layer of the technology stack but that can be distinguished from any other NFT.⁵¹ Another frequently discussed type of cryptocurrency is a stablecoin. A stablecoin is a token that, by design, features a stable price. Many varieties of stablecoins exist, each with different design features and related contractual provisions.⁵² A host of other types of cryptocurrency also exist, including governance tokens and non-native protocol tokens, among others. A discussion of the nuances of each of these, however, lies beyond the scope of this report.

For the purposes of this report, the Work Group uses the term cryptocurrency to refer broadly to any intrinsic cryptocurrency and token. Where recommendations must be more specific, the Work Group employs the name of the specific class of cryptocurrency, or the specific cryptocurrency.

⁴⁴ For corpus linguistics studies analyzing the level of the disconnect in terminology for cryptocurrency and oft used synonyms for cryptocurrency, see Carla L. Reyes, *Emerging Technology’s Language Wars: Cryptocurrency*, 64 WM. & MARY L. REV. _ (forthcoming 2023) [hereinafter Reyes, *Language Wars: Cryptocurrency*].

⁴⁵ For this reason, this Report does not employ the term “cryptoassets.”

⁴⁶ Reyes, *Language Wars: Cryptocurrency* *supra* note 44.

⁴⁷ *Id.*

⁴⁸ NARAYANAN ET AL, *supra* note 15, at 51.

⁴⁹ *Id.* at 65-66; ANTONOPOULOS & WOOD, *supra* note 37, at 2.

⁵⁰ ANTONOPOULOS & WOOD, *supra* note 37, at 127.

⁵¹ See Juliet M. Moringiello & Christopher K. Odinet, *The Property Law of Tokens*, 74 FL. L. REV. 607 (2022).

⁵² See Kara J. Bruce, Christopher K. Odinet & Andrea Tosato, *The Private Law of Stablecoins*, AZ. ST. L.J. _ (forthcoming 2023), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4191646 (describing the diversity of stablecoin implementations).

THE STATE OF BLOCKCHAIN-RELATED INDUSTRY IN TEXAS

Introduction

Over the past few years Texas has experienced tremendous growth in the blockchain technology and cryptocurrency sector. The nature of cryptocurrency is designed to not be confined to regional constraints, as like the internet itself, one of the primary benefits is the accessibility it allows for developers and users. However, Texas has become the home of young cryptocurrency companies that align with the Texas’ ethos of “self-empowerment” and wariness of excessive regulation.⁵³ In particular following China’s ban on cryptocurrency mining in September 2021, Texas became the go-to destination for major cryptocurrency mining firms, such as Blockcap and Riot Blockchain.⁵⁴ This migration partially resulted from the cheap price of electricity in Texas,⁵⁵ but the Legislature also led the way in crafting a regulatory framework to host a booming, yet primitive, cryptocurrency industry.⁵⁶

This section of the Report outlines the landscape of the blockchain and cryptocurrency space within Texas. It is comprised of two parts:

1. A dataset of companies operating within Texas’ blockchain economy; and
2. An overview of blockchain-related educational opportunities offered by public and private academic institutions within the state of Texas.

The list of companies used in this Report was compiled from a Crunchbase database snapshot of companies from early 2022, which was filtered to include only Texas-based companies,⁵⁷ and from data provided by the partners and members of the Texas Blockchain Council as of June 2022. Information related to these companies was sourced from company websites, Crunchbase, LinkedIn, Texas Comptroller Taxable Entity Search, and the OpenCorporates database.

Texas currently has the second largest GDP of any U.S. state,⁵⁸ and Texas features an abundance of available resources and affordable real estate; making it fertile ground to grow the United States’ blockchain industry. For an industry to grow, the region must also be a cultural fit such as New York for finance, or Los Angeles for entertainment. As a state home to multiple regions with their own unique culture, there is a cultural fit for the many emerging industries making use of blockchain technology within Texas. A few notable players within the industry have already come

⁵³ James Pollard, *Texas Republicans Want to Make the State the Center of the Cryptocurrency Universe*, THE TEX. TRIB. (Oct. 10, 2021), <https://www.texastribune.org/2021/10/28/texas-republicans-blockchain-bitcoin/>.

⁵⁴ Turner Wright, *City of Forth Worth Votes in Favor of Bitcoin Mining Program*, COINTELEGRAPH (Apr. 26, 2022) <https://cointelegraph.com/news/city-of-fort-worth-votes-in-favor-of-bitcoin-mining-program>.

⁵⁵ *Texas Electricity Prices*, Energybot (last updated Oct. 2022) <https://www.energybot.com/electricity-rates/texas/#:~:text=Last%20updated%20June%202022,lower%20than%20the%20national%20average> (last visited Oct. 29, 2022).

⁵⁶ Pollard, *supra* note 53.

⁵⁷ *Daily CSV Export*, CRUNCHBASE DATA, <https://data.crunchbase.com/docs/daily-csv-export> (Data obtained Jan. 27, 2022, filtered for Texas and companies containing “Blockchain” in their category description).

⁵⁸ *GDP by State 2022*, WORLD POPULATION REV., <https://worldpopulationreview.com/state-rankings/gdp-by-state>.

out of the Dallas-Fort Worth area including Hudson Jameson, one of the best-known faces of Etheruem;⁵⁹ Coinsource, the world's largest Bitcoin ATM operator (which operates out of Fort Worth);⁶⁰ and Zabo, an application programming interface (API) for cryptocurrency recently acquired by Coinbase.⁶¹

Each blockchain ecosystem includes an interconnected economy of companies who serve particular functions to support the framework. These companies can be separated into the following general categories:

- **Enterprise Blockchain:** Permissioned blockchain technology that can be used to streamline business processes at scale (i.e., supply chain management, exchange of digital information);
- **Mining:** The process that bitcoin and other cryptocurrencies use to validate transactions amongst parties using their token. Computers on the network perform calculations that verify and record every transaction ("hash"), securing the blockchain, and in return receive newly minted cryptocurrency;
- **Protocol:** A set of rules that define how data is shared between different computer systems. A blockchain framework will include several protocols including a security protocol, network protocol, and consensus protocol. Often these protocols are designed to enable the blockchain technology to target a specific issue;
- **DeFi:** Financial application tools that are built with blockchain-based smart contracts without reliance upon a central authority. Examples of DeFi applications include decentralized exchanges (DEX), certain stablecoins, and certain lending platforms;
- **Investment:** This category includes venture capital funds that invest in cryptocurrency businesses as well as investment (hedge) funds that invest only within the cryptocurrency space;
- **Consulting/Services:** Services businesses providing advisory, development, or implementation services for businesses functioning in the blockchain industry; and
- **Other:** This includes companies that do not fit into any of the above categories, such as bitcoin ATM services, cryptocurrency wallet developers, etc.

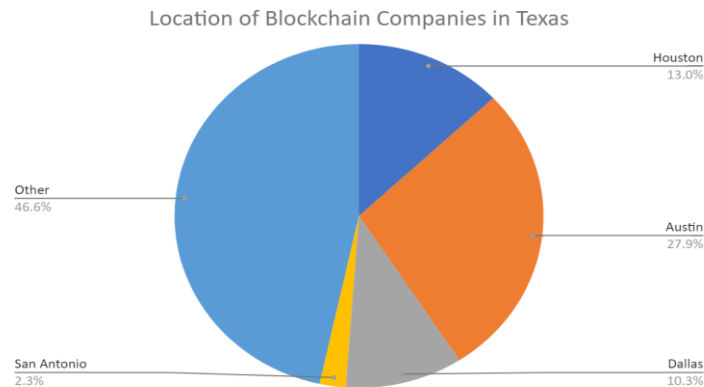
⁵⁹ Hudson Jameson, *Hudson's Blog*, <https://hudsonjameson.com/> (last visited Nov. 5, 2022).

⁶⁰ Coinsource, <https://coinsource.net/> (last visited Nov. 5, 2022).

⁶¹ Natalie Walters, *Here's Why Crypto Companies are Flocking to Texas*, DALLAS MORNING NEWS (May 20, 2022 7:01 AM), <https://www.dallasnews.com/business/banking/2022/05/20/texas-quietly-tries-to-steal-silicon-valleys-thunder-as-the-go-to-state-for-crypto/>.

Background: The Texas' Blockchain Industry

Blockchain technology has had a widespread impact across Texas. Overall, the Work Group identified 262 blockchain companies that are either headquartered in Texas or have a significant presence in the state. Of these, about half of the companies are located outside of the four major metropolitan areas of Houston, Austin, Dallas, and San Antonio, as shown below.



Of course, certain industries tend to concentrate in certain regions for a variety of reasons whether it be the availability of necessary real estate or attracting skilled talent. As of 2019, there were 19,200 total employed software developers in the Austin-Round Rock area.⁶² Recently a massive influx of new blockchain developers joined the Austin area.⁶³ While Dallas, on the other hand, features companies focused on enterprise blockchain solutions⁶⁴ such as DSX Access Systems, a provider of hardware and software products for scalable businesses. Houston is also home to a number of blockchain-related businesses.⁶⁵

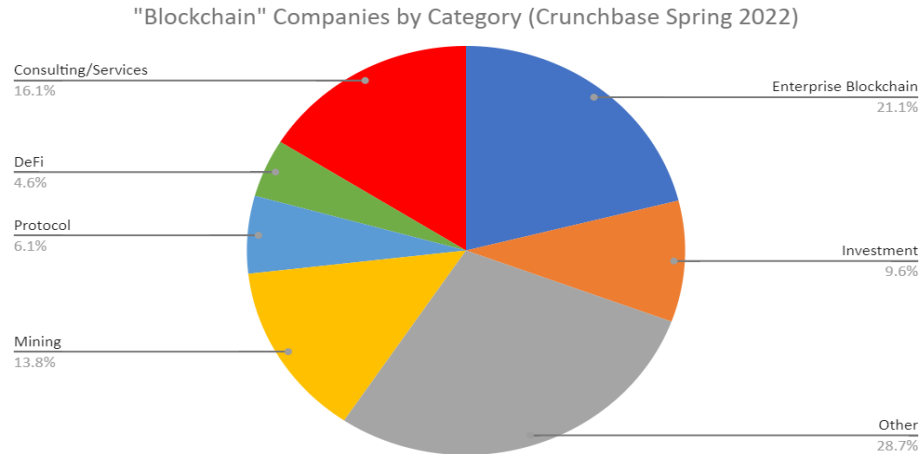
Overall, a significant number of businesses in each of the identified blockchain categories make Texas their home, with the category of “Others” making up the largest section—these businesses include Bitcoin ATM services, cryptocurrency wallet developers, etc. The next largest groups of businesses come from the Enterprise Blockchain and Cryptocurrency Mining categories.

⁶² *Id.*

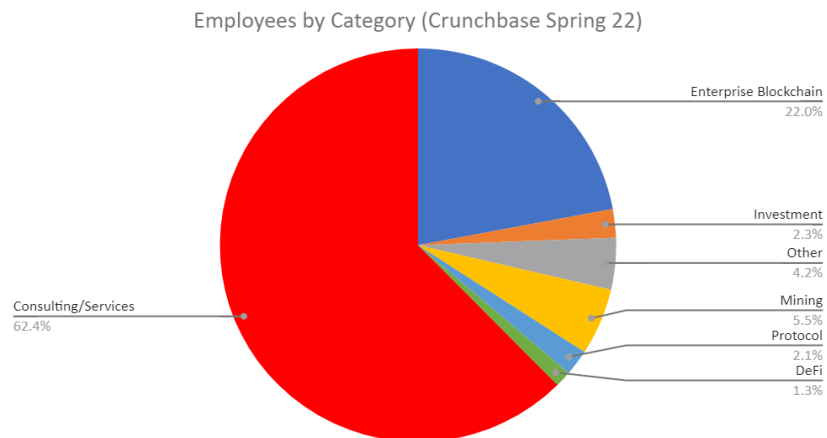
⁶³ *Id.*

⁶⁴ *Id.*

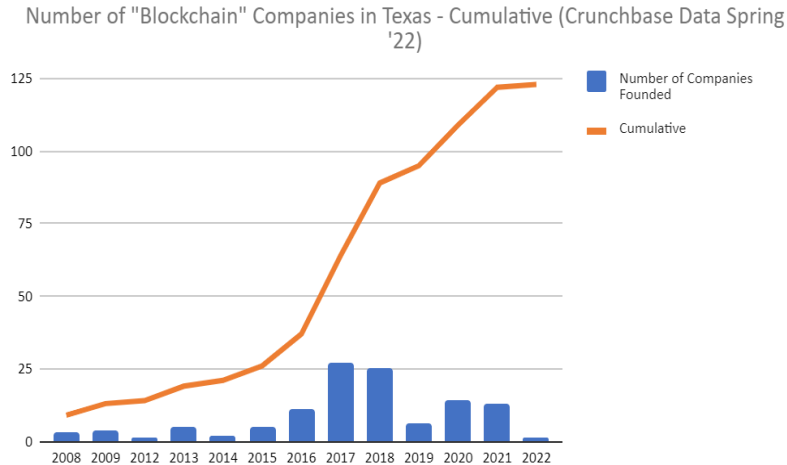
⁶⁵ For example, the Work Group received testimony from Brent de Jong, Chairman and CEO of QENTA which created and provides support services for G-Coin (a gold-backed token). Written Testimony of Brent de Jong, CEO of QENTA, provided at the Work Group’s Public Hearing on May 20, 2022 [hereinafter “De Jong Testimony”].



The next area of inquiry centers on employment and year of incorporation. Crunchbase contained data for only 124 of the 262 companies in the dataset. With regard to employment, consulting and services companies make up a little less than two-thirds of employees in the space. This is likely because of a combination of factors including that the interactive services provided by these companies simply require more human capital than startups or mining companies. In addition, more than any other surveyed category, the businesses that occupy “consulting and services” tend to work in areas apart from blockchain/cryptocurrency as well, and this broader level of expertise naturally requires more staff on payroll.



In addition, many of the companies in our study incorporated beginning in 2017, particularly in the midst of the 2017-18 and recent 2020-21 bull cycles, suggesting that mainstream popularity seems to have inspired innovation in the blockchain/cryptocurrency industry.



This is not a particularly surprising trend, given that the focus of entrepreneurs and technicians naturally will turn to those areas, such as blockchain/cryptocurrency, that have garnered institutional investment as well as media coverage. However, another explanation for this sustained increase in blockchain businesses is that these companies are filling an increase in demand as more practicable use cases develop and more companies implement and/or are open to adoption of blockchain technology within their business systems.

The ways in which businesses implement blockchain technology and generate revenue are varied. And so, for the purposes of providing a comprehensive picture of the potential that blockchain technology may serve for the state of Texas, it is helpful to look at each of these business categories individually so as to best understand where Texas may be best positioned to succeed.

1. Enterprise Blockchain

Enterprise blockchain refers to blockchain networks that are being designed for corporations to streamline business processes at scale.⁶⁶ Making use of the tamper-resistance and transparency inherent in the blockchain, corporations may monitor supply chains and settle global payments with improved accuracy and lower costs. Major corporations such as IBM, Microsoft, and JPMorgan, have been developing their own enterprise blockchain solutions.⁶⁷ Most enterprise blockchain projects use a permissioned system and fall either into “private” or “consortium” categories.⁶⁸ A “private” blockchain protocol has one central authority in charge of the network which has the power to override transactions and gives users the most privacy.⁶⁹ For example,

⁶⁶ Alyssa Hertig, *What is an Enterprise Blockchain*, COINDESK (FEB. 19, 2021), <https://www.coindesk.com/tech/2021/02/19/what-is-an-enterprise-blockchain/>.

⁶⁷ Rachel Wolfson, *12 of the Biggest Enterprise Blockchain Players of 2020*, COINTELEGRAPH (Dec. 28, 2020), <https://cointelegraph.com/news/12-of-the-biggest-enterprise-blockchain-players-of-2020> (last visited Nov. 5, 2022); see also Michel Rauchs, et. al., *2nd Global Enterprise Blockchain Benchmarking Study* (2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3461765.

⁶⁸ Anshika Bhalla, *A Comprehensive Guide to Enterprise Blockchain*, Blockchain Council (May 19, 2021), <https://www.blockchain-council.org/blockchain/a-comprehensive-guide-to-enterprise-blockchain/>.

⁶⁹ As a result, many tend to consider such project distributed ledgers. See Richard Gendal Brown, *Introducing R3 CORDATM: A Distributed Ledger Designed for Financial Services* (Apr. 5, 2016),

Blockgraph uses a blockchain-based system created by Comcast and other partners which enables the advertisers who maintain private nodes of the network to harness audience data and better advertise to customers while protecting their privacy.⁷⁰ This makes sense for enterprises that handle sensitive information of their users or hold valuable trade secrets as only authenticated users can enter the system. On the other hand, a “consortium” blockchain has multiple organizations that govern the platform. One example is the Global Shipping Business Network Consortium developed by CargoSmart, a not-for-profit blockchain consortium network designed to digitize the shipping industry and facilitate the secure, seamless exchange of data amongst participants.⁷¹ Compared to a private blockchain, this type of permissioned network requires more coordination and allows other corporations in the network access to the ledger. However, this type of structure also prompts more collaboration and interoperability amongst members. Because no single entity controls the system and all parties validate the data before it is recorded on-chain, this allows for trustless, secure communication amongst participants.

Although it strays farther from the decentralized ideal of cryptocurrency, large corporations often opt for permissioned networks because this allows them to selectively keep certain information confidential. In addition, the transaction speed of private networks is faster because there are less users on the network and on public blockchains every node must confirm transactions. A public blockchain like Bitcoin processes about five (5) transactions per second (“TPS”) and Ethereum about double that amount.⁷² This is simply incapable of supporting the business operations of large corporations like Visa and Mastercard that currently support thousands of transactions per second.⁷³ However, enterprise blockchain retains many of the benefits of blockchain technology while catering towards the needs of scaling businesses. Massive demand for enterprise blockchain services exists. In 2021, worldwide spending on blockchain solutions reached \$6.6 billion.⁷⁴ Also according to Deloitte’s 2021 Global Blockchain Survey, 78% of overall respondents said “[their] executive team believes there is a compelling business case for the use of blockchain, digital assets, and/or cryptocurrencies within my organization or project.”⁷⁵

Many believe that one of the most promising use cases of enterprise blockchain lies in the context of supply chain management.⁷⁶ With the use of blockchain platforms, businesses can increase supply chain visibility and traceability—participants can record price, date, location, quality,

<https://gandal.me/2016/04/05/introducing-r3-corda-a-distributed-ledger-designed-for-financial-services/> (last visited Nov. 5, 2022).

⁷⁰ BLOCKGRAPH, THE BLOCKGRAPH PLATFORM, <https://www.blockgraph.co/platform/platform-overview> (last visited Oct. 29, 2022).

⁷¹ GSBN, OUR VISION, <https://www.gsbnt.trade/our-vision> (last visited Oct. 29, 2022).

⁷² *Transactions Per Second (TPS)*, BINANCE ACADEMY <https://academy.binance.com/en/glossary/transactions-per-second-tps> (last visited Oct. 29, 2022).

⁷³ Jeffrey Craig, *What is Transactions Per Second (TPS): A Comparative Look At Networks*, PHEMEX (Nov. 2, 2021) <https://phemex.com/blogs/what-is-transactions-per-second-tps>.

⁷⁴ Lionel Sujay Vailshery, *Blockchain – Statistics & Facts*, Statista (Mar. 22, 2022) <https://www.statista.com/topics/5122/blockchain/#dossierKeyfigures>.

⁷⁵ Matthew Budman, et. al., *Deloitte’s 2021 Global Blockchain Survey*, DELOITTE INSIGHTS (2021) https://www2.deloitte.com/content/dam/insights/articles/US144337_Blockchain-survey/DI_Blockchain-survey.pdf.

⁷⁶ See Adam J. Sulkowski, *Blockchain, Law and Business Supply Chains: The Need for Governance and Legal Frameworks to Achieve Sustainability*, 43 DEL. J. CORP. L. 303 (2019).

certification, and other relevant information crucial to managing their businesses.⁷⁷ Conventional record keeping remains prone to execution errors such as mistakes in inventory data, missing shipments, and duplicate payments.⁷⁸ Despite auditing and marking inventory, managers are limited in their decision-making and communication capabilities. On the other hand, in blockchain record keeping, assets and participants are given unique identifiers that enable every step of the transaction to be recorded on-chain as a block; each block is encrypted by a hashing process that links it to all the previous blocks and is distributed to all participants.⁷⁹ In theory, this produces a complete and tamper-resistant trail of activities in the supply chain.⁸⁰ Furthermore, blockchain technology gives parties the ability to selectively share their real-time data with other companies without significant integration needed. By giving parties access to more data and eliminating the double-spend problem, companies may improve the efficiency and speed of transactions.

Walmart recently implemented a private blockchain solution to create an automated system for managing invoices to and payments from vendors.⁸¹ Previously, 70% of invoices were disputed, and now less than 1% of invoices have discrepancies and carriers get paid on time instead of encountering frequent delays.⁸² In addition, the large market for enterprise blockchain solutions prompted collaboration between historical competitors within the blockchain industry in hopes of speeding up the development of widely applicable technology.⁸³

In general, trade and supply chains play a huge role in Texas's economy. In 2019, more than 1.1 million Texas jobs were supported by exports, by far the most among states.⁸⁴ Also, Texas has recently unveiled plans for developing rare earth deposits and supply chains, designed to respond to the recent semiconductor shortage and a 50% EV sales share goal by 2030 set by the Biden administration.⁸⁵ Texas' mining-friendly regulation and solid infrastructure already attracted major mining companies like USA Rare Earth and companies with production lines that require these rare earth materials (i.e. Samsung and Tesla).⁸⁶ Incorporating effective enterprise blockchain solutions into these efforts would increase economic efficiencies and improve supply chain resilience. In addition, significant momentum exists to push semiconductor manufacturing to U.S.

⁷⁷ Stephen Laaper, *Using Blockchain to Drive Supply Chain Transparency*, DELOITTE (2022) <https://www2.deloitte.com/us/en/pages/operations/articles/blockchain-supply-chain-innovation.html>.

⁷⁸ Vishal Gaur and Abhinav Gaiha, *Building a Transparent Supply Chain*, HARV. BUS. REV. (May-June 2020) <https://hbr.org/2020/05/building-a-transparent-supply-chain>.

⁷⁹ NARAYANAN, ET. AL., *supra* note 15, at 65.

⁸⁰ Sulkowski, *supra* note 76.

⁸¹ Kate Vitasek, John Bayliss, Loudon Owen & Neeraj Srivastava, *How Walmart Canada Uses Blockchain to Solve Supply-Chain Challenges*, HVD. BUS. REV. (Jan. 5, 2022) <https://hbr.org/2022/01/how-walmart-canada-uses-blockchain-to-solve-supply-chain-challenges>.

⁸² *Id.*

⁸³ Ian Allison, *IBM-R3 Pact Shows Tech Trumps Tribe in Enterprise Blockchain*, CoinDesk (last updated Sept. 14, 2021 at 5:23 A.M. CDT), <https://www.coindesk.com/business/2020/10/23/ibm-r3-pact-shows-tech-trumps-tribe-in-enterprise-blockchain/> (last visited Nov. 5, 2022).

⁸⁴ Texas Comptroller of Public Accounts, *Texas Supply Chain*, <https://comptroller.texas.gov/economy/economic-data/supply-chain/2021/texas-snap.php> (last visited Nov. 5, 2022).

⁸⁵ Emily Pickrell, *Texas Provides Model for Much-Needed Supply Chain Overhaul*, FORBES (Feb. 18, 2022, 7:00 PM EST), <https://www.forbes.com/sites/uhenergy/2022/02/18/texas-provides-model-for-much-needed-supply-chain-overhaul/?sh=168a21de67b7>.

⁸⁶ *Id.*

shores, such as the \$52 billion CHIPS Act and the FABS Act.⁸⁷ Passage of this legislation would surely attract semiconductor manufacturers to Texas—a state with plenty of industrial space. Deloitte estimates that the global semiconductor chip industry will reach about \$600 billion in 2022.⁸⁸ If more production does shift to the U.S., Texas is well positioned to take advantage of these new opportunities⁸⁹ especially with the use of enterprise blockchain solutions.

2. Mining

Latest estimates report that Texas accounts for 14% of Bitcoin’s hash rate, the fourth largest of any U.S. state behind New York, Kentucky, and Georgia.⁹⁰ However, this statistic may represent an understatement, given the dataset did not account for all U.S. mining hash rates, including Riot Blockchain, a large operator with a major presence in Texas.⁹¹ Of the United States’ 3,500 megawatts of Bitcoin mining capacity, more than 40% is with ERCOT, the primary supplier of electricity in Texas.⁹²

Established mining operations are expanding into Texas⁹³ and operations with roots already in Texas have plans to expand.⁹⁴ In addition, thousands of pounds of bitcoin mining equipment is being shipped from China to Texas as some of the biggest bitcoin mining companies in the world move their operations to Texas because of its cryptocurrency-friendly lawmakers, deregulated power grid, and commitment to renewable energy.⁹⁵ This is perhaps best illustrated by Fort Worth’s latest move to become the first city government in the United States to mine bitcoin.⁹⁶ A venture that will undoubtedly serve as a great opportunity for the city government to learn about this new technology and how it may best guide growth in the blockchain industry.

⁸⁷ *Congress Passes Investment in Domestic Semiconductor Manufacturing, Research & Design*, SEMICONDUCTOR INDUSTRY ASSOCIATION <https://www.semiconductors.org/chips/> (last visited Nov. 5, 2022).

⁸⁸ Brandon Kulik, et. al., 2022 *Semiconductor Industry Outlook*, DELOITTE (2022) <https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/semiconductor-industry-outlook.html>.

⁸⁹ Texas Comptroller of Public Accounts, *Texas Statewide Supply Chain Overview*, <https://comptroller.texas.gov/economy/economic-data/supply-chain/2021/texas.php> (last visited Nov. 5, 2022).

⁹⁰ Tolu Okuwoga, *Bitcoin Mining in The U.S.: 4 States Attract The Most Miners*, NEWSBTC (2021) <https://www.newsbtc.com/news/bitcoin/bitcoin-mining-in-the-u-s-4-states-attract-the-most-miners/>.

⁹¹ *Id.*

⁹² Walters, *supra* note 61.

⁹³ Written Testimony of Argo Blockchain CEO Peter Wall (May 19, 2022) (“Argo Blockchain is a publicly traded cryptocurrency mining company with operations in Canada and the United States. Our flagship Bitcoin mining facility, Helios, is located in Dickens County, Texas.”) [hereinafter “Wall Testimony”]; *see also*, Aoyon Ashraf, *Mawson to Develop New Bitcoin Mining Site in Texas*, COINDESK (May 16, 2022 10:35 A.M. CDT) <https://www.coindesk.com/business/2022/05/16/mawson-to-develop-new-bitcoin-mining-site-in-texas/>. The Work Group notes here its gratitude to Mr. Wall and Argo Blockchain for its submission of testimony in connection with the Work Group’s Public Hearing on May 19, 2022.

⁹⁴ Aoyon Ashraf, *Mawson to Develop New Bitcoin Mining Site in Texas*, COINDESK (Apr. 27, 2022 at 10:23 A.M. CDT), <https://www.coindesk.com/business/2022/04/27/riot-blockchain-to-develop-1gw-of-bitcoin-mining-capacity-in-texas/>.

⁹⁵ Leigh Cuen, *How Texas is Becoming a Bitcoin Mining Hub*, TECH CRUNCH (Feb. 11, 2022 9:15 AM CST) <https://techcrunch.com/2022/02/11/how-texas-is-becoming-a-bitcoin-mining-hub/>.

⁹⁶ MacKenzie Sigalos, *Fort Worth is the First City in the U.S. to Mine Bitcoin, and Will Run Mining Rigs Out of City Hall*, CNBC (Apr. 26, 2022 12:01 PM EDT), <https://www.cnbc.com/2022/04/26/fort-worth-tx-the-first-city-in-the-us-to-mine-bitcoin.html>.

Although mining revenues have fallen to the lowest they have been in almost two years, bitcoin mining is still a very lucrative industry: in June 2022 bitcoin miners produced \$656.47 million in revenue, according to a Binance study.⁹⁷ Also, the price of bitcoin mining machines tend to follow the price of bitcoin,⁹⁸ which makes it an opportune time for businesses to actually accumulate capital and get operations in place for the next bull-run.

Bitcoin mining companies are setting up facilities in rural Texas, such as Whinstone in Rockdale,⁹⁹ providing much needed economic stimulation to communities that have seen huge job losses as coal plants and aluminum manufacturing facilities have closed over the years.¹⁰⁰ Local businesses benefited from this increase in demand and many local residents obtained higher paying jobs by the new mining companies.¹⁰¹ However, it is worth noting that bitcoin miners face many of the same challenges faced by the oil and gas producers operating in these regions in the past. There have been issues providing housing and amenities for their employees.¹⁰² Miners make investments in the local community as they set up operations.¹⁰³ Miners seem to be investing in building the proper infrastructure but it will take some time for these rural communities to convert this influx of capital into long-term economic prosperity.¹⁰⁴

The most cited criticism of bitcoin mining is that its energy consumption raises serious environmental concerns.¹⁰⁵ Latest data suggests that worldwide bitcoin mining consumes as much as all refrigerators in the United States; or in other words, its consumption levels are nearly equivalent to those of Thailand or Malaysia.¹⁰⁶ However, in reality, bitcoin mining consumes much smaller amounts of energy than the consumption levels produced from the practices of other

⁹⁷ Best Owie, *Bitcoin Miner Revenues Surpass Ethereum But There's More*, BINANCE (July 4, 2022 23:18), <https://www.binance.com/en/news/top/7143795>.

⁹⁸ Zack Voell, *As Bitcoin Price Falls, is Now the Time to Buy Mining Rigs*, BITCOIN MAG. (JUNE 21, 2022), <https://bitcoinmagazine.com/business/bitcoin-price-falls-mining-rigs-sell>.

⁹⁹ The Work Group would like to thank the City of Rockdale for taking the time to host the Work Group's members and discuss the positive impact the establishment of bitcoin mining has made in the community. The Work Group would also like to thank the City of Rockdale for its testimony at the May 2022 public hearing of the Work Group.

¹⁰⁰ Testimony from the City of Rockdale at the Public Hearing of the Work Group on Blockchain Matters (May 20, 2022) [hereinafter Rockdale Testimony]; Wall Testimony, *supra* note 93 (explaining that Dickens County population is down 28% as of the 2020 census from the 2010 census, and that during construction of Helios, Argo Blockchain created more than 130 temporary jobs, and that the operation now supports 45 full time jobs, supports the community through tax revenue and increased economic activity, and through charitable donations, such as the refurbishment of the Spur community pool which has been closed since 2009).

¹⁰¹ Rockdale Testimony, *supra* note 100.

¹⁰² Shelly Hagan, *Texas Bitcoin Miners Seek Cheap Power, Land and a Place to Stay*, Bloomberg (May 4, 2022 8:00 AM CDT), <https://www.bloomberg.com/news/articles/2022-05-04/texas-bitcoin-miners-seek-cheap-power-land-and-a-place-to-stay>.

¹⁰³ David Kidd, *A Small Town in Texas Turns to Bitcoin Mining to Survive*, Governing Mag. (May 19, 2020), <https://www.rockdalemdd.org/news/small-town-texas-turns-bitcoin-mining-survive>.

¹⁰⁴ *Id.*

¹⁰⁵ See, e.g., Elizabeth Warren, et. al., Letter to ERCOT (Oct. 12, 2022), <https://www.warren.senate.gov/imo/media/doc/Letter%20to%20ERCOT%20re%20Cryptomining.pdf>.

¹⁰⁶ *Crypto and the Climate*, COINBASE INSTITUTE (May 18, 2022) [https://assets.ctfassets.net/c5bd0wqjc7v0/68OxzK3XB8QaAuREGhS6PB/be0909f89fb1b532cda51a4088b3130c/Co](https://assets.ctfassets.net/c5bd0wqjc7v0/68OxzK3XB8QaAuREGhS6PB/be0909f89fb1b532cda51a4088b3130c/Coinbase_Institute_-_Climate_Paper_2022.pdf)inbase_Institute_-_Climate_Paper_2022.pdf.

common industries such as gold mining and air conditioning.¹⁰⁷ Furthermore, measuring electricity use by mining does not present a complete picture of the blockchain industry's environmental impact because not all energy is created equally. Consumption practices that rely more heavily on renewable energy will have a smaller carbon footprint. In particular, cryptocurrency mining has been a massive adopter of renewable energy practices.¹⁰⁸ Data that paints a picture of bitcoin mining's carbon footprint tends to vary because the mix of energy sources that mining facilities utilize is frequently in flux. In 2021, the Bitcoin Mining Council reported that the mining industry used about 56% sustainable energy during Q1 2021.¹⁰⁹ Previously, a 2020 University of Cambridge study reported that 29% of Bitcoin mining is powered by renewables.¹¹⁰

The use of renewables should only increase as operations shift from China to Texas, which has been incentivizing renewable energy initiatives. In 2021, Texas led the country in building renewable energy projects—it installed 7,352 megawatts of new wind, solar, and energy projects; the next largest installer was California which installed 2,697 megawatts.¹¹¹ In addition, Texas currently leads the nation in wind-powered electricity generation, producing approximately 26% of the United States' total net wind generation.¹¹² However, as Texas shifts to an energy mix more reliant on renewables and the demand for energy within the state increases this puts additional pressure to solve for the current grid's shortcomings that were on display in the winter storm of February 2021.

Two major costs associated with renewables are transportation and storage. Wind and solar farms, which require a lot of land, are often in remote, rural locations and then the energy generated there must be transferred to the populous regions which is where the energy is currently demanded. However, many of these bitcoin mining facilities are being built in the same rural areas, therefore limiting the cost of transportation and wasted electricity that comes from pylon congestion.¹¹³ Secondly, wind and solar power generation capacity is subject to variations in the weather. As a result, ERCOT accounts for these colder months and targets a reserve margin. Keeping this energy in reserve requires battery storage, and while Texas has plans to drastically increase battery storage

¹⁰⁷ See, e.g., Dan Ashmore, *Global Air Conditioning Consumers 16 Times the Amount of Electricity as Bitcoin—Deep Dive on Bitcoin's Energy Consumption*, COINJOURNAL (Mar. 28, 2022), <https://coinjournal.net/news/global-air-conditioning-bitcoins-energy-consumption/>.

¹⁰⁸ Indeed, Argo Blockchain cites Texas' "high amount of renewable energy in its grid mix, primarily wind and solar power," as one of two primary reasons for the "strategic decision to locate [its] flagship Helios facility in Texas." Wall Testimony, *supra* note 93.

¹⁰⁹ Sebastian Sinclair, *Bitcoin Mining Council Says Sustainable Power Mix on the Rise*, CoinDesk (last updated Sept. 14, 2021 1:26 AM CDT), <https://www.coindesk.com/markets/2021/07/02/bitcoin-mining-council-says-sustainable-power-mix-on-the-rise/>.

¹¹⁰ Apolline Blandin, et. al., *3rd Global Cryptoasset Benchmarking Study* (Sept. 2020), <https://www.jbs.cam.ac.uk/wp-content/uploads/2021/01/2021-ccaf-3rd-global-cryptoasset-benchmarking-study.pdf>.

¹¹¹ Emma Newburger, *Texas Led the Country in New Renewable Energy Projects Last Year*, CNBC (Feb. 18, 2022 1:00 PM EST), <https://www.cnbc.com/2022/02/18/texas-led-the-country-in-new-renewable-energy-projects-last-year.html>.

¹¹² Ryan Dusek, *Cryptocurrency in Texas: Why Bitcoin Mining is Taking Off in The Lone Star State*, JDSUPRA (June 8, 2022), <https://www.jdsupra.com/legalnews/cryptocurrency-in-texas-why-bitcoin-5755771/#:~:text=Bitcoin%20miners%20have%20started%20to,renewables%2C%20particularly%20wind%20energy%3B%20and.>

¹¹³ NRG Editorial Voices, *Transmission Congestion & Constraints: Market Impediment or Opportunity?*, NRG, <https://www.nrg.com/insights/energy-education/transmission-congestion---constraints.html>.

installation, more will be needed.¹¹⁴ The Federal Reserve of Dallas anticipates reserve margins will exceed 30% between 2023 and 2026.¹¹⁵ The addition of miners will encourage investment for renewable projects because they will improve returns for project investors and developers and serve as flexible consumers of energy during this massive switch to renewables, which will require experimentation and supply-demand fluctuation.¹¹⁶

Bitcoin mining is an industry based on maximizing margins, and so miners are most profitable when they are optimized for the local environment. ERCOT runs on a system of supply and demand, which results in fluctuating energy prices.¹¹⁷ Miners have the unique capability to turn off and on their operations at a moment's notice. Thus, miners can be extremely beneficial in managing the grid so as demand does not grossly exceed supply, resulting in blackouts. Already miners have played a part in providing grid stability. In July 2022, many parts of Texas experienced days of temperatures over 100 degrees Fahrenheit calling for "record high electric demand" and many Bitcoin miners scaled back or shut down operations to level off demand.¹¹⁸

Looking ahead, at the Bitcoin 2022 Conference in Miami, Adam Block's Blockstream and Jack Dorsey's Block announced intent to build a pilot cryptocurrency mine in Texas that will be powered 100% by renewable energy.¹¹⁹ Furthermore, mining companies are not only interested in renewables because it is an affordable source of electricity, it also provides them a profit-making opportunity.

*"When you can consume 20% of your electricity on site and sell roughly 80% back into the grid, and can shut down our miners in a minute if we need during peak hours, that offers a massive benefit with regards to smoothing our supply and demand across the energy grid." - Caleb Ward, Geosyn Mining co-founder.*¹²⁰

The beauty of bitcoin mining's migration to Texas is that it gives the state an opportunity to lead the world in establishing sustainable practices around blockchain technology. As states like New York ban bitcoin mining operations,¹²¹ Texas may position itself to have major mining companies cater their infrastructure to renewable energy sources. In return, they may have partners in steering

¹¹⁴ Garrett Golding, *Surging Renewable Energy in Texas Prompts Electricity Generation Adequacy Questions*, FED. RESERVE BNK OF DALLAS (Aug. 17, 2021), <https://www.dallasfed.org/research/economics/2021/0817>.

¹¹⁵ *Id.*

¹¹⁶ *Bitcoin is Key to an Abundant, Clean Energy Future*, SQUARE (Apr. 2021), https://assets.ctfassets.net/2d5q1td6cyxq/5mRjc9X5LTxFFihIIIt7QK/e7bcb47217b60423a01a357e036105e/BCEI_White_Paper.pdf.

¹¹⁷ *Supply and Demand*, ERCOT (last updated Nov. 5, 2022 23:35 CT), <https://www.ercot.com/gridmktinfo/dashboards/supplyanddemand>.

¹¹⁸ Turner Wright, *Crypto Miners in Texas Shut Down Operations as State Experiences Extreme Heat Wave*, COINTELEGRAPH (July 11, 2022), <https://cointelegraph.com/news/crypto-miners-in-texas-shut-down-operations-as-state-experiences-extreme-heat-wave>.

¹¹⁹ Eliza Gkritsi, *Tesla, Blockstream, Block to Mine Bitcoin Using Solar Power in Texas*, COINDESK, (Apr. 8, 2022 at 11:33 PM CDT), <https://www.coindesk.com/tech/2022/04/08/tesla-blockstream-and-block-to-mine-bitcoin-using-solar-power-in-texas/>.

¹²⁰ Cuen, *supra* note 95.

¹²¹ MacKenzie Sigalos, *New York Just Passed a Bill Cracking Down on Bitcoin Mining*, CNBC (June 3, 2022 2:07 AM EDT), <https://www.cnbc.com/2022/06/03/heres-whats-in-new-yorks-new-bitcoin-mining-ban-.html>.

a more seamless transition to clean energy, and bring jobs and infrastructure to regions of their state that have been previously neglected.

3. Decentralized Finance (“DeFi”)

DeFi, or decentralized finance, is a particular type of protocol that aims to leverage smart contracts to create a financial system without centralized authorities.¹²² In theory, the goal of this decentralized system is to limit accumulation of wealth by intermediaries and allow for more transparency and inclusivity than the current traditional financial system. However, while the use of smart contracts limits human error and the need for intermediaries, it also comes with limitations. Any error within the code could be exploited and lead to a loss of funds that are rarely covered by insurance.¹²³

*“DeFi is easier to access for underbanked populations and provides faster settlements for users, but it’s still a work in progress with flaws like hacks, bugs and ‘outright scams,’” said Zach Pandl, co-head of foreign exchange strategy for Goldman Sachs.*¹²⁴

Currently, the mainstream use cases of DeFi include lending, borrowing, decentralized trading and yield-aggregating.¹²⁵ However, new tools are being developed within the space that parallel those offered within traditional finance (TradFi). One example which recently gained some traction is DeFi derivative products, which are complemented with built-in tools to guide and educate the user on how to implement financially sound strategies.¹²⁶ A focus on simplicity and user-experience is driving mainstream adoption of both Financial Technology (“FinTech”) applications, like Robinhood, and DeFi protocols alike.

The necessity of DeFi can be debated but it is undeniable that there is tremendous room for growth. The \$240 billion DeFi market is miniscule compared to consumer banking which is estimated at \$2.3 trillion and, even more so, the market cap of global equities which is estimated at over \$100 trillion.¹²⁷ There is a rapidly growing user base who would like to interact with greater autonomy and transparency that DeFi allows¹²⁸ and there is still only a 5% penetration rate amongst 221 million global cryptocurrency users.¹²⁹ As the ecosystem becomes more frictionless and continues

¹²² E. Napoletano & Benjamin Curry, *What is DeFi? Understanding Decentralized Finance*, FORBES ADVISOR (Apr. 8, 2022, 9:51 AM), <https://www.forbes.com/advisor/investing/cryptocurrency/defi-decentralized-finance/>

¹²³ Alex Lielacher, *Advantages & Disadvantages of DeFi*, TRUST WALLET (Nov. 18, 2020), <https://trustwallet.com/blog/advantages-disadvantages-of-defi>

¹²⁴ Jacquelyn Melinek, *Goldman Sachs: DeFi Has its Advantages Over Traditional Finance*, BLOCKWORKS (Oct. 22, 2021, 4:44 PM EDT), <https://blockworks.co/goldman-sachs-defi-has-its-advantages-over-traditional-finance/>.

¹²⁵ Artem Tolkachev, *DeFi can be 100 Times Larger than Today in 5 Years*, COINTELEGRAPH (Nov. 6, 2021), <https://cointelegraph.com/news/defi-can-be-100-times-larger-than-today-in-5-years>.

¹²⁶ Yenwen Feng, *Is the Rise of Derivatives Trading a Risk to Retail Crypto Investors*, COINTELEGRAPH, (Jan. 30, 2022), <https://cointelegraph.com/news/is-the-rise-of-derivatives-trading-a-risk-to-retail-crypto-investors>.

¹²⁷ Tolkachev, *supra* note 125.

¹²⁸ Jimmy Yin, *Liquidity has Driven DeFi’s Growth to Date, So What’s the Future Outlook?*, COINTELEGRAPH, (May 1, 2022), <https://cointelegraph.com/news/liquidity-has-driven-defi-s-growth-to-date-so-what-s-the-future-outlook>.

¹²⁹ Tolkachev, *supra* note 125.

developing new services, mainstream adoption will very likely continue to grow. Therefore, it is paramount for Texas to keep up with innovation within the space.

Austin has been dubbed by some as “Silicon Hills,” as many developers have been flooding the area.¹³⁰ The technology industry makes up 17.1% of all jobs in Austin compared to 9.2% of the national job market, and over the last five years, employment in Austin’s high-tech industry has grown by 24.4%.¹³¹ Technology companies are coming to Texas in search of lower real estate, favorable tax laws, and less regulation.¹³² Investments in education, diverse talent, and infrastructure will also help Texas become a hub for top talent and startups developing blockchain protocols.¹³³ Establishing Texas as not only an attractive space for companies to come, but also a breeding ground for protocol companies to form and develop will be essential to Texas’ long-term success within the space.

As a leader for blockchain innovation, Texas must set the stage with regulation that ensures protocols have users’ best interests to reliably assess value and risks while maintaining the benefits they offer: efficiency, security, and control. In particular, the SEC emphasizes a lack of transparency and pseudonymity as the two primary issues in DeFi that regulators must address before integration into investment markets.¹³⁴ While thoughtful regulation takes time, especially for technology with such massive ramifications, Texas should continue to rigorously monitor activities in the space to protect consumers.¹³⁵ State securities regulators have already taken steps to shut down operations that break existing securities laws and potentially defraud the public.¹³⁶

4. Investment

Even while attracting blockchain and cryptocurrency companies to Texas, the Legislature should consider the necessary conditions for recruiting investors focused on the industry to come to Texas as well. In Deloitte’s Global 2021 Blockchain Survey, 33% of respondents stated they planned on investing more than \$10 million in blockchain/digital assets in the next 12 months.¹³⁷ The

¹³⁰ Eduardo Arabu, *Austin: The Rise of Silicon Hills*, U.S. CHAMBER OF COMM. FOUNDATION (May 23, 2013), <https://www.uschamberfoundation.org/blog/post/austin-rise-silicon-hills/33984>.

¹³¹ Beverly Kerr, *High Tech Industry*, AUSTIN CHAMBER (June 8, 2021), <https://www.austinchamber.com/blog/06-08-2021-high-tech-industry>.

¹³² WinMax Blog Team, *Why are Technology Companies Flocking to Austin, Texas?*, AUSTIN TECH. COUNCIL (May 14, 2021), <https://www.austintechnologycouncil.org/why-are-technology-companies-flocking-to-austin-texas/>.

¹³³ Jeffery Bussgang, Craig Montuori, & William Brah, *How to Attract Startups and Tech Companies to a City Without Relying on Tax Breaks*, HVD. BUS. REV. (May 15, 2019), <https://hbr.org/2019/05/how-to-attract-startups-and-tech-companies-to-a-city-without-relying-on-tax-breaks>.

¹³⁴ Jeffrey Schultz, Daniella Gordon & Ryan Aloysius Smith, *Decentralized Finance and the Biden Administration’s Key Priorities*, ARMSTRONG TEASDALE (Mar. 15, 2022), <https://www.armstrongteasdale.com/thought-leadership/decentralized-finance-defi-and-the-biden-administrations-key-priorities-part-ii-of-iv/>.

¹³⁵ The Work Group is grateful to Texas State Securities Board Commissioner Iles for testifying at the Work Group’s August 19, 2022 public hearing, at which he emphasized the important role that agency plays in protecting consumer investors and the public.

¹³⁶ Stuart D. Levi, Alexander C. Drylewski, Daniel Michael, & Anita Oh, *Texas, Alabama Regulators Order Halt to Virtual Casino NFT Sales, Alleging They Constituted an Offering of Securities and Misled Buyers*, SKADDEN (Apr. 20, 2022), <https://www.skadden.com/insights/publications/2022/04/texas-alabama-regulators-order-halt#:~:text=In%20April%202022%2C%20securities%20regulators,Gambler%20and%20Golden%20Gambler%20NFTs.>

¹³⁷ Budman, et. al., *supra* note 75.

migration of mining companies to Texas gained the attention of investors, particularly those interested in developing sustainable operations.¹³⁸ The bitcoin mining boom has even spurred related financial inclusion efforts such as Energyfounders, a Texas crowdfunding platform that sells equity shares of bitcoin mining operations through its Bitcoin Discovery Fund.¹³⁹

Despite market volatility, venture capitalists are still very eager to invest in blockchain and cryptocurrency startups. According to CB Insights' "2021 State of Blockchain Report," venture capital funding for blockchain startups was \$25.2 billion last year, a 713% YoY increase from \$3.1 billion in 2020.¹⁴⁰ In addition, venture funding for NFT projects was \$4.8 billion in 2021, up 12,878% from \$37 million in 2020.¹⁴¹ Furthermore, in 2021 240 DeFi deals were executed globally, almost twice as many as the 124 deals reached in 2020.¹⁴² Overall, 1,247 blockchain deals were executed in 2021, 79% of which were early-stage investment.¹⁴³ While Pitchbook data predicts a small dip in VC investments in cryptocurrency startups in 2022, many venture funds do not seem to be dissuaded by the market volatility and some are even doubling down on great companies with now more favorable valuations.¹⁴⁴ As to where the funding is being directed, blockchain infrastructure is the most popular at 21%, followed by DeFi, centralized finance, NFTs, Web3 categories, and lastly DAOs at 2%.¹⁴⁵

Although investment totals may not be as large, interest from investors has not waned, and, if anything, it seems to have increased. According to a PWC June 2022 report, 38% of traditional hedge funds currently invest in digital assets, up from 21% the year before.¹⁴⁶ Also, cryptocurrency hedge funds are continuing to explore DeFi operations and attract talent. The investment and enterprise sectors of a state's economy tend to exist in a cyclical ecosystem, as growth in one encourages the other. In 2021, New York metro-based cryptocurrency companies led the way in

¹³⁸ Jeremy Blackman and Austin Bureau, *Investors are Swarming to Crypto in Texas. Can the State's Fragile Grid Deliver?*, HOUSTON CHRONICLE (May 18, 2022 1:30 PM), <https://www.houstonchronicle.com/politics/texas/article/Investors-are-swarming-to-crypto-in-Texas-Can-17176539.php>

¹³⁹ Stacy Elliott, *Texas Crowdfunding Company Offers Investors Bitcoin Mining Equity Through New Fund*, DECRYPT (May 4, 2022), <https://decrypt.co/99480/texas-crowdfunding-platform-offers-investors-fractional-ownership-bitcoin-mines>.

¹⁴⁰ *State of Blockchain*, CB INSIGHTS, https://www.cbinsights.com/reports/CB-Insights_Blockchain-Report-2021.pdf?

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ Hannah Miller, *VCs Are Still Rushing to Back Crypto Startups*, BLOOMBERG (June 1, 2022), <https://www.bloomberg.com/news/newsletters/2022-06-01/in-crypto-downturn-startups-are-still-getting-venture-capital-dollars>.

¹⁴⁵ Jacquelyn Melinek, *VC Funding for Crypto Projects Fell in May, but Many Investors Remain Bullish*, TECHCRUNCH (June 1, 2022 3:00 PM CDT), <https://techcrunch.com/2022/06/01/vc-funding-for-crypto-projects-fell-in-may-but-many-investors-remain-bullish/>.

¹⁴⁶ *More than a Third of Traditional Hedge Funds Now Invest in Digital Assets, Nearly Double a Year Ago*, PWC (June 8, 2022), <https://www.pwc.com/gx/en/news-room/press-releases/2022/pwc-global-crypto-hedge-fund-report-2022.html>.

VC funding with \$6.5 billion, followed by Silicon Valley (\$3.9 billion), and then Los Angeles and Miami (over \$760 million).¹⁴⁷

At present cryptocurrency companies are certainly coming to Texas, but they are receiving funding from non-Texas-based banks and funds.¹⁴⁸ This is an opportunity for Texas' financial industry to grow and develop expertise for this emerging industry. Texas-based company Multicoin Capital announced in July 2022 that it would be investing another \$430 million into crypto startups.¹⁴⁹ In this cryptocurrency winter, Texan financial players may establish positions in blockchain/cryptocurrency companies with sustainable business models and technology at reasonable prices. In the process they will not only hopefully yield great returns as some firms did with their investments in Apple and Google, but have a seat at the table in guiding the growth of this emerging technology into a sustainable, beneficial ecosystem.

5. Consulting/Services and Other

As blockchain technology becomes more prevalent, existing businesses will start to build out infrastructure to support operations in the space. A few of these services include monitoring, managing data, advertising, and conducting analysis to improve products and comply with regulatory bodies like the Commodities Futures Trading Commission ("CFTC"). In addition, new companies will emerge to service this new, growing niche of clientele. The growth of the blockchain/cryptocurrency services should grow along with the businesses at the center of this ecosystem, as the businesses with proper support and tools will succeed in this competitive market, and in turn the services will look to set up shop in those areas that are proximate to the most clientele.

In addition, other businesses that do not fit into a neat category will also likely find homes in those areas that welcome innovation and can benefit from existing infrastructure. For example, the cryptocurrency ATM firm Coin Cloud announced in June 2021 that they would install 29 Bitcoin kiosks into H-E-B grocery stores in the Houston area.¹⁵⁰ Another example is Eggschain, a healthcare technology company that uses a blockchain-based supply chain system to track blood, genome, tissues, organs, and other biospecimens.¹⁵¹ The company's goal is to assure safety and quality of frozen reproductive tissue for patients and health professionals.¹⁵² A state that welcomes

¹⁴⁷ Adriana Gomez Licon, *Miami's Crypto Craze on Full Display at Bitcoin Conference*, AP NEWS (Apr. 6, 2022), <https://apnews.com/article/cryptocurrency-technology-business-blockchain-lifestyle-e0b51430d7b3c4853cd4618984b7d484>.

¹⁴⁸ Yogita Khatri, *Bitcoin Mining Firm Argo Blockchain takes \$20 Million Loan to Build Out Texas Facility*, THE BLOCK (June 30, 2021, 6:59 AM EDT), <https://www.theblock.co/linked/110073/bitcoin-mining-argo-blockchain-loan-galaxy-digital-texas>.

¹⁴⁹ Bessie Liu, *Despite Slow Q2, VC Dollars Are Coming Back to Crypto*, Blockworks (July 12, 2022, 5:15 PM EDT), <https://blockworks.co/despite-slow-q2-vc-dollars-are-coming-back-to-crypto/>.

¹⁵⁰ Turner Wright, *Texas Crypto Users Will Soon be Able to Buy and Sell Tokens at Major Supermarket Chain*, COINTELEGRAPH (June 18, 2021), <https://cointelegraph.com/news/texas-crypto-users-will-soon-be-able-to-buy-and-sell-tokens-at-major-supermarket-chain>.

¹⁵¹ Shannon Jameson, *Eggschain, Pioneering Chain of Custody Solution for Fertility Treatments and Other Biospecimens, Officially First Healthcare Biotech on Bitcoin Blockchain*, YAHOO FIN. (Dec. 7, 2021), <https://finance.yahoo.com/news/eggschain-pioneering-chain-custody-solution-140000980.html>.

¹⁵² *Id.*

integration of blockchain solutions into public and private-run operations, like supply chains and health care, will be more attractive to innovative companies like Eggschain because it will be easier for them to integrate into existing systems.

Cryptocurrency makes sense in Texas because it is a technology that is designed to limit the involvement of intermediaries. Furthermore, hosting state and municipal government transactions on a public ledger would make officials more accountable to their constituents.¹⁵³

“I think there’s a libertarian ethos at the heart of the blockchain and crypto community that has naturally drawn [cryptocurrency companies] to Texas.” - Ali Agha, CEO of Dallas blockchain company Olypsis Technologies¹⁵⁴

Secondly, as it stands, proof-of-work systems that run the Bitcoin Blockchain consume a lot of energy. Texas leads the country in new clean power installations and development. Welcoming blockchain and cryptocurrency companies onto the Texas electrical grid will further facilitate development of these facilities and guide the technology industry into adopting more sustainable practices. Finally, Texas is a state with growing populations of younger people and minorities.¹⁵⁵ Investing in cryptocurrency tends to be more popular amongst both younger people¹⁵⁶ and minorities.¹⁵⁷ It was reported that 29% of Texans own Bitcoin or other cryptocurrencies, and 37% of Hispanic Texans own cryptocurrency—way above the national averages.¹⁵⁸ It would make sense for the state’s economy to reflect the values and interests of its citizens.

Becoming a leader in blockchain and cryptocurrency will not only prop up metropolitan regions of Texas like “Silicon Hills,” but it will bring much-needed capital infusions to rural regions of Texas that host cryptocurrency-mining facilities and accommodate their employees. Rick Perry, former Governor of Texas, characterized Blockcap’s move to Texas last year as “a major accelerant for job creation and sustainable economic growth in the state for years to come.”¹⁵⁹ By welcoming this new technology into the state, Texas will keep critical technology from being developed offshore. In this new economy, entrepreneurs need to be supported and grown within the United States.

¹⁵³ Seth Bodine, *Forth Worth Embraces Cryptocurrency, Becomes First City in U.S. to Mine Bitcoin*, FORT WORTH RPT. (Apr. 26, 2022), <https://fortworthreport.org/2022/04/26/fort-worth-embraces-cryptocurrency-becomes-first-city-to-mine-bitcoin/>.

¹⁵⁴ Walters, *supra* note 61.

¹⁵⁵ Mitchell Schnurman, *A Beacon for Young Families: Texas Added Over 400,000 Children and Teens in the Past Decade*, The Dallas Morning News (Aug. 22, 2021), <https://www.dallasnews.com/business/economy/2021/08/22/a-beacon-for-young-families-texas-added-over-400000-children-and-teens-in-the-last-decade/>

¹⁵⁶ Eric Rosenberg, *Younger Generations More Bullish on Cryptocurrencies*, INVESTOPEDIA (Apr. 4, 2022), <https://www.investopedia.com/younger-generations-bullish-on-cryptocurrencies-5223563>.

¹⁵⁷ CHARLES SCHWAB, ARIEL-SCHWAB BLACK INVESTOR SURVEY (2022) https://www.arielinvestments.com/images/stories/PDF/2022-ariel-schwab-black-investor-survey-findings_4.5.22.pdf

¹⁵⁸ Texas Blockchain Council, *Texas Blockchain Council at Consensus*, YOUTUBE (Jul. 13, 2022), <https://www.youtube.com/watch?v=f76IfSiqaCk>.

¹⁵⁹ *Former Texas Governor Welcomes Bitcoin Leader to Austin*, PR NEWswire (Apr. 9, 2021), <https://www.prnewswire.com/news-releases/former-texas-governor-welcomes-bitcoin-leader-to-austin-301266085.html>.

Policy Recommendations

It is essential that Texas establish itself as first-to-market for establishing support and infrastructure for cryptocurrency companies to thrive, as well as implement regulation so that these companies and entrepreneurs know what they can and cannot do. Currently with respect to cryptocurrency investment, Texas faces stiff competition from New York City and San Francisco. While it is often cited that overly harsh regulation may dissuade companies, 28 out of the top 50 cryptocurrency companies, based on valuations, are domiciled in the United States.¹⁶⁰ The states with the most are California (15), New York (5), and Florida (2). This speaks to the strength of U.S. innovation and investment. Where Texas can differentiate itself is by continuing to be a leader in cryptocurrency-related legislation, in order to attract companies dissuaded by regulatory uncertainty and provide a solid foundation for young startups. The Work Group's twenty-one legislative recommendations and four additional recommendations for policy-related resolutions further discussed below each represent key steps in a master plan designed to differentiate Texas in the minds of those developing the blockchain technology and cryptocurrency companies of the future.

¹⁶⁰ *The Cryptocurrency Company Index*, CRYPTO HEAD, <https://cryptohead.com/cryptocurrency-company-index/> (last visited Nov. 5, 2022).

ACADEMIC, EDUCATION, AND WORKFORCE NEEDS

Introduction

Creating a workforce prepared to innovate and execute with excellence is key to the economic prosperity of Texas. A multifaceted, accessible, and effective education system is a prerequisite for creating such a workforce. An educated and skilled workforce generates local innovation and attracts businesses and capital from outside the state, creating a virtuous cycle of growth in both skill and economic production. In preparing this report, the Work Group researched the use of blockchain technology within the Texas education system and current coursework related to blockchain at both the K-12 and university levels.

Blockchain technology has a role to play in uplifting the education system—and the labor market—in Texas in three main ways:

- 1) By enhancing student and parent ownership of and control over personal educational data, when used in combination with the open standards for digital credentialing described in this report;
- 2) By facilitating the verification of prior learning and achievement across geographical jurisdictions and software platforms; and
- 3) By serving as the subject matter for new curricula, course offerings, and professional certification programs to provide skilled labor for companies leveraging blockchain technology that have operations in Texas.

In addition, Texas has an opportunity to solidify itself as a hub for blockchain enterprise and cryptocurrency innovation by incentivizing the industry to connect with Texas universities. When the industry is invested in recruiting from students graduating from Texas schools, blockchain enterprise and cryptocurrency companies will grow their existing presence within Texas.

Background: Education for a Skilled Workforce

The State of Texas has robust programs in place to connect education with workforce development. The blockchain industry is already benefiting from these programs by recruiting from a talent pool of workers proficient in various elements of distributed ledger technology. As educational institutions continue to expand their offerings centered on blockchain technology architectures, incentive structures, and mining (among other topical areas), the industry stands to benefit more over time.

Educational institutions can also make use of blockchain's function as a digital verification infrastructure to validate prior learning and achievement. This is already being trialed by several schools in Texas who are using blockchain technology as an "anchor" to verify academic records. However, this report recommends that the use of blockchain technology for credentialing makes use of public blockchain networks and emerging open technology standards for digital identity (as

outlined in the “Digital Identity” section below) in order to ensure that students—and parents, before the student reaches age of majority—own and control the data produced about learners in this manner.

1. College, Career, and Military Preparation

College, Career, and Military Preparation (“CCMP”) has been a key pillar of the Texas education system for decades, ensuring that Texas produces a competitive workforce that spurs economic dynamism in the state. Today, the organizational structure of CCMP within the Texas Education Agency (“TEA”) has three main divisions:¹⁶¹

- A. **Career and Technical Education.** This component involves the creation of programs of study for implementation in Texas high schools that includes scaffolded course offerings that prepare students to earn industry-based certifications (“IBCs”).¹⁶² Local education agencies (“LEAs”)—school districts and open-enrollment charter schools—earn points in academic accountability for career-ready students.
- B. **Counseling, Advising, and Student Support.** TEA supports school counseling initiatives with a professional development and technical assistance to support implementation of comprehensive school counseling programs, including individual student planning for college and career. This team also supports a program called “Communities in School” (“CIS”). Through this program, the TEA provides grants (using a combination of state and federal funding) to local CIS affiliates that provide support for LEAs, students, and parents in identifying and meeting the specific needs of students who are at risk of dropping out.¹⁶³
- C. **Postsecondary Preparation Programs (P3).** These programs prepare students for college by enabling them to earn college credits—and even an associate degree—while still in high school. The team supports College & Career Readiness School Models (“CCRSM”), which include Early College High Schools (“ECHS”) and Pathways in Technology Early College High Schools (“P-TECH”).¹⁶⁴ Both the Advanced Placement (“AP”) and International Baccalaureate (“IB”) programs fall under P3.

¹⁶¹ Interview with Alexis Bauserman, Director of the College, Career, and Military Prep Division at the Texas Education Agency. July 19, 2022 [hereinafter “Bauserman Interview”]. The Work Group thanks Alexis Bauserman for her time and contributions.

¹⁶² *Career and Technical Education*, TX ED. AGENCY, <https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education> (last visited Nov. 5, 2022).

¹⁶³ *Communities in Schools of Texas*, TX ED. AGENCY, <https://tea.texas.gov/texas-schools/support-for-at-risk-schools-and-students/communities-in-schools>.

¹⁶⁴ *Texas College and Career Readiness School Models (CCRSM)*, TX ED. AGENCY <https://tea.texas.gov/academics/college-career-and-military-prep/texas-college-and-career-readiness-school-models-ccrsm>.

In 2018, Texas implemented a new *A-F* accountability system for LEAs.¹⁶⁵ The Texas Education Code defines the accountability system in broad strokes, while the Texas Commissioner of Education adopts further rules in the Texas Administrative Code to define its specifics annually. This system “grades” LEAs on a 100-point scale in a series of domains. A component of the accountability system is college, career, and military readiness. This component provides an opportunity for graduates to demonstrate career readiness by earning an IBC. There is an accountability system “reset” planned for 2023 to update the current system.¹⁶⁶

2. Professional Certification Program in Bitcoin Mining

Despite the volatility of bitcoin’s price, bitcoin mining remains profitable for efficient miners.¹⁶⁷ Mining is one of the most lucrative blockchain-enabled industries today, and Texas has already established itself as an epicenter of bitcoin mining.

In June of 2021, the government of China banned bitcoin mining in that country.¹⁶⁸ In response, Texas Governor Greg Abbott invited Chinese bitcoin miners to relocate to Texas, citing low energy costs and a favorable regulatory environment.¹⁶⁹ By the end of the year, Texas was arguably the leading U.S. state jurisdiction for bitcoin mining, depending on the dataset consulted.

In January of 2022, the Texas Bitcoin Foundation (“TBF”) launched to “drive research and education about the social and economic impacts of bitcoin.”¹⁷⁰ The TBF is a 501(c)3 organization that produces original research and education about bitcoin and related historical and scientific issues.¹⁷¹ The TBF partnered with Texas State Technical College (“TSTC”) to develop the first professional certification programs in bitcoin mining offered by a U.S. institute of higher education.

The TBF facilitated knowledge-sharing between TSTC and bitcoin mining companies with operations in Texas. The TBF also provided a grant to support the first cohort of students in TSTC’s bitcoin mining courses, which are slated to begin in January 2023. The grant was enabled by a donation from Felicia and Gideon Powell, Texas-based energy entrepreneurs and philanthropists.

TSTC uses employer demand as a gauge for whether to develop and deliver particular courses. In Texas, employer demand for bitcoin mining is significant enough to warrant the creation of these

¹⁶⁵ *Performance Reporting*, TX ED. AGENCY, <https://tea.texas.gov/texas-schools/accountability/academic-accountability/performance-reporting>.

¹⁶⁶ Bauserman Interview, *supra* note 161.

¹⁶⁷ Wayne Duggan & Farran Powell, *Is Bitcoin Mining Profitable in 2022*, FORBES (Aug. 4, 2022), <https://www.forbes.com/advisor/investing/cryptocurrency/is-bitcoin-mining-profitable-in-2022/>.

¹⁶⁸ Marco Quiroz-Gutierrez, *Crypto is fully banned in China and 8 other countries*, FORTUNE (Jan. 4, 2022), <https://fortune.com/2022/01/04/crypto-banned-china-other-countries/>.

¹⁶⁹ MacKenzie Sigalos, *New York and Texas are Winning the War to Attract Bitcoin Miners*, CNBC (Oct. 9, 2021), <https://www.cnbc.com/2021/10/09/war-to-attract-bitcoin-miners-pits-texas-against-new-york-kentucky.html>.

¹⁷⁰ Texas Bitcoin Foundation, *Texas Bitcoin Foundation Launches to Drive Research and Education about the Social and Economic Impacts of Bitcoin*, PR NEWswire (Jan. 25, 2022), <https://www.prnewswire.com/news-releases/texas-bitcoin-foundation-launches-to-drive-research-and-education-about-the-social-and-economic-impacts-of-bitcoin-301467186.html>.

¹⁷¹ Texas Bitcoin Foundation, <https://www.txbitcoinfoundation.org/>.

new professional certification programs. Over time, these programs could be extended to the high school level and offered as IBCs through the Career and Technical Education program overseen by the TEA.

3. The Use of Blockchain for Credentialing in Texas Education

A. Texas College Bridge

When the COVID-19 pandemic began, LEAs across Texas adopted various school closure and virtual learning policies.¹⁷² This had a measurable impact on student educational outcomes and raised concerns about students falling behind in, among other areas, college readiness.¹⁷³ In response, TEA put together a grant package for LEAs—the Texas COVID Learning Acceleration Supports, or TCLAS, grant—that enabled them to leverage federal COVID relief funds for a wide scope of educational activities.¹⁷⁴ A program called “Texas College Bridge” (“TCB”) was included in this grant package and officially launched in the spring semester of 2021.¹⁷⁵

Under Texas Education Code § 28.014, every Texas LEA is required to partner with at least one institution of higher education (“IHE”) to develop and provide college preparatory courses in both English language and mathematics.¹⁷⁶ These courses must be offered by at least one education provider in the LEA. Typically, this partnership between an LEA and an IHE is defined in a memorandum of understanding (“MOU”). If students complete this course, they are exempt from the Texas Success Initiative Assessment (“TSIA”).¹⁷⁷

TCB created a standardized opportunity for LEAs to implement these college prep courses by creating a single MOU that both LEAs and IHEs can sign onto if they choose (participation in the program is voluntary). Additionally, the TCB offers free, online delivery of both the English and math college prep courses. The TCB is not administered by the TEA directly, but rather by Commit2Dallas, otherwise known as the Commit Partnership, a 501(c)3 educational nonprofit dedicated to promoting equality of educational and vocational outcomes in Texas.¹⁷⁸ The TEA provides a grant to the Commit Partnership, who in turn uses it to license the TCB’s online curriculum from an education technology company called NROC.¹⁷⁹ This makes participating in the TCB program effectively free for LEAs.

¹⁷² *School Responses in Texas to the Coronavirus (COVID-19) Pandemic*, BALLOTPEDIA N.D., [https://ballotpedia.org/School_responses_in_Texas_to_the_coronavirus_\(COVID-19\)_pandemic](https://ballotpedia.org/School_responses_in_Texas_to_the_coronavirus_(COVID-19)_pandemic).

¹⁷³ Tx. Ed. Agency, *Impacts of COVID-19 and Accountability Updates for 2022 and Beyond*, TX ASSESSMENT CONF., <https://tea.texas.gov/sites/default/files/2021-tac-accountability-presentation-final.pdf>.

¹⁷⁴ *Texas COVID Learning Acceleration Supports (TCLAS)*, TX. ED. AGENCY, <https://tea.texas.gov/texas-schools/health-safety-discipline/covid/texas-covid-learning-acceleration-supports-tclas>.

¹⁷⁵ *Prepare for College with Texas College Bridge*, TX COLLEGE BRIDGE <https://texascollgebridge.org/>.

¹⁷⁶ *H.B. 5: Other Frequently Asked Questions*, TX. ED. AGENCY, https://tea.texas.gov/sites/default/files/HB5_Other_FAQ_051514.pdf.

¹⁷⁷ *The TSIA (Texas Success Initiative Assessment)*, TX. ED. AGENCY, <https://tea.texas.gov/academics/college-career-and-military-prep/the-tsia-texas-success-initiative-assessment>.

¹⁷⁸ The Commit Partnership. <https://commitpartnership.org/what-we-do>; see also *Commit2Dallas*, PROPUBLICA, <https://projects.propublica.org/nonprofits/organizations/800790222>.

¹⁷⁹ The NROC Project, <https://www.nroc.org/tools-courses>.

Students who complete a TCB course receive a certificate of completion which is valid for up to two years. To deliver the TCB certificate to students, the Commit Partnership contracts with GreenLight Credentials, a Texas-based company that provides educational credentialing software.¹⁸⁰ GreenLight advertises its use of blockchain technology to verify student records.¹⁸¹ GreenLight has built and maintains a private blockchain using IBM Hyperledger Fabric, which it uses to store hashes of the PDF credentials (not the credentials themselves).¹⁸²

In addition to providing certificates of completion for TCB courses via the Commit Partnership, GreenLight also contracts directly with LEAs across Texas to issue academic transcripts and diplomas using the same blockchain-anchored PDF format. The GreenLight platform is designed to enable students to store their academic records in one place and use their “digital lockers” to apply to multiple colleges and jobs at once. The platform is also a marketplace that enables employers to search for students matching particular job qualifications; they can then invite these students to apply for jobs through the platform. As of Q3 2022, the company maintains that over 120 educational institutions and over 500 employers use their platform, with over 2 million digital lockers assigned.¹⁸³

GreenLight’s growing presence in the state of Texas has prompted backlash from some parents who are concerned about how the company is storing and sharing student data.¹⁸⁴ The use of blockchain technology in GreenLight’s solution has particularly worried parents that student data may be stored on an immutable ledger and shared without their consent.¹⁸⁵ The State Work Group on Blockchain Matters addresses these concerns in the Education Recommendations below.

B. Tri-Agency Workforce Initiative

In 2016, Texas Governor Greg Abbott established the Tri-Agency Workforce Initiative, which was subsequently codified by the Legislature in 2021 under House Bill (“H.B.”) 3767.¹⁸⁶ This initiative was designed to create shared objectives across the TEA, Texas Higher Education Coordinating Board (“THECB”), and Texas Workforce Commission (“TWC”) in order to achieve state educational and workforce outcomes more effectively.

The passage of the Tri-Agency Workforce Initiative legislation kicked off a strategic planning process across the agencies to create shared objectives and workstreams. For example, one of the

¹⁸⁰ GreenLight Credentials, <https://greenlightlocker.com/>.

¹⁸¹ *About Us*, GreenLight Credentials, <https://www.glccredentials.com/about-us> [hereinafter GreenLight About Us]; Global Silicon Valley, *Blockchain and Credential Liquidity Across Pre-K to Grey*, YouTube (Aug. 18, 2021), <https://www.youtube.com/watch?v=EsOIdllsPmk>.

¹⁸² Interview with Amin Qazi, COO of GreenLight Credentials (Oct. 26, 2021).

¹⁸³ GreenLight, *About Us*, *supra* note 180.

¹⁸⁴ Alison McDowell, *Clip: Texas Blockchain Hearing with Lynn Davenport on Public Education and Greenlight Credentials*, YouTube (May 20, 2022), <https://www.youtube.com/watch?v=y4-49DHEzNk>.

¹⁸⁵ The Work Group is grateful to the members of the public who attended the May 20, 2022 Public Hearing of the Texas State Work Group on Blockchain Matters. The Work Group is also grateful to the representative of GreenLight who attended the same hearing and for the constructive dialogue engaged by all participants at the hearing.

¹⁸⁶ *Tri-Agency Workforce Initiative*, TX. WORKFORCE CMMS’N, <https://www.twc.texas.gov/agency/tri-agency>.

initiatives mentioned in H.B. 3767 is the creation of a “Credential Library” for the state of Texas.¹⁸⁷ This Credential Library will collect and store all credentials issued by Texas institutions, as well as learning pathways for earning those credentials which learners can use to map their educational plans. The TWC has provided full funding for Phase 1 of the Credential Library project and kicked off the planning process with the vendor it selected to build the Library.¹⁸⁸ That vendor, Credential Engine, is a non-profit specializing in the building and maintenance of digital credential libraries.¹⁸⁹ The Credential Engine has done extensive work to develop a Credential Transparency Description Language (“CTDL”), which “provides the common language and ‘rules of the road’ for how credentials, credentialing organizations, quality assurance information, and competencies are described both in the Registry and on the Web.”¹⁹⁰

The use of a Credential Library with well-defined educational and career pathways, in combination with blockchain-enabled open standards for digital credentialing as discussed in the Digital Identity section of this Report, provides the best of both worlds: 1) easily-searchable data on education and career pathways that students, parents, education providers, and employers can immediately make use of; and 2) parent and student ownership of and control over personal educational data. This marriage of public utility and personal privacy is uniquely enabled by the properties of blockchains, but only when used in combination with open standards for digital credentialing as described in this report.

Key Issues for Blockchain-Related Economic Growth in Texas

The best compliment to a thriving industry is strong education. When higher education institutions build strong educational programs catered to serving the surrounding economy, companies are incentivized to hire in-state. In addition, proximity to top universities allows companies to easily retain the consulting and training services of university faculty. In return, graduates receive high paying salaries and benefits that will allow for them to generously donate to their alma maters, creating better educational opportunities for the next class of students.

Research supports that universities are an important driver of human capital and entrepreneurship to their local areas.¹⁹¹ There are institutionalized links between local firms and universities. Proximity to the university allows firms to keep costs of formal and informal recruitment low and alumni representatives are more likely to hire people from their alma mater. In addition, students have access to more internship opportunities throughout the school year at local firms. Lastly, the local economy benefits from university business “incubators,” where students may start their own

¹⁸⁷ H.B. 3767, “The Texas Education and Workforce Alignment Act” (2021), <https://capitol.texas.gov/tlodocs/87R/billtext/html/HB03767H.htm>.

¹⁸⁸ Interview with Emily Lawley, Manager of Tri-Agency & Special Projects in the Workforce Development Division at the Texas Workforce Commission (Aug. 4, 2022).

¹⁸⁹ Credential Engine, <https://credentialengine.org/>.

¹⁹⁰ *About Us*, CREDENTIAL ENGINE, <https://credentialengine.org/about/#how-we-address-quality>.

¹⁹¹ David Huffman & John M. Quigley, *The Role of the University in Attracting High Tech Entrepreneurship: A Silicon Valley Tale*, THE ANNALS OF REGIONAL SCI., <http://urbanpolicy.berkeley.edu/pdf/HQ02PB.pdf>.

ventures with the support of university resources. Sometimes these ventures gain traction and become local firms.

The companies considered as today's major tech firms seem to follow this localized pattern of hiring. For example, Amazon and Microsoft, who are both headquartered in Seattle, hire a majority of their employees from the University of Washington.¹⁹² While for Silicon Valley-based firms Apple, Facebook, and Google, the university they most often pull from is Stanford University - an institution with ties to Silicon Valley since the 1950s.

Institutions of higher education benefit as well. A large part of why students choose a certain university or educational opportunity is the employment prospects that come along with it. A University of Cambridge study found that "student centered pedagogy and students' career and financial aspirations [are] major determinants of intention to donate."¹⁹³ Furthermore, focusing on the development of applicable skills may also improve student retention because the opportunity cost would decrease. It is incredibly important that university resources are directed towards equipping students with experience and skills that reflect employment opportunities. More so, individuals that feel a strong sense of identity with an organization may be more likely to donate.¹⁹⁴ Cryptocurrency is not only an industry, but it is a culture that represents creativity, community, and liberation. Major institutions and thought leaders are also incredibly eager to engage and educate the mainstream public and policymakers. Institutions can harness their existing infrastructure and students to become leaders within the space in their own right - hosting research projects, labs, and hackathons.

However, the number of learning opportunities in Texas universities lags behind the growth of the surrounding industry and its demand for young talent. As of May 2022, our study shows that Texan universities offer around 60 courses and programs specific to blockchain topics. These include the UT system, the A&M system, Texas State University, TCU, SMU, Rice University, Texas Tech and the University of North Texas. These universities together educate almost half a million students. Except for UT Austin McCombs School of Business' "Blockchain Initiative,"¹⁹⁵ no other noteworthy, research-focused program or institution could be found at considered universities. Regarding professional education, Texas A&M Texarkana sticks out with several, specialized certificates, such as Ethereum Developer courses. While these may not be exclusive to enrolled university students, such professional certificates nonetheless help educate the wider public and ecosystem. Business schools in the Lone Star State offer classes on Financial Technology (FinTech) and entrepreneurship with a blockchain-focus. In addition, Computer Science departments host classes on cryptography and distributed-ledger systems.

¹⁹² Macy Bayern, *Top 10 US Universities that Produce the Most Staff for Global Tech Firms*, TECHREPUBLIC (May 21, 2020, 6:00 AM PDT), <https://www.techrepublic.com/article/top-10-universities-that-produce-the-most-staff-for-global-tech-firms/>.

¹⁹³ Aftab Dean & John Graeme McLean, *Adopting Measure to Increase Alumni Donation at Prestigious Universities* 16 INT'L J. BUS. & MGMT. (2021).

¹⁹⁴ Genevieve G. Shaker & Victor M.H. Borden, *How Donors Give to Higher Education: Thirty Years of Supporting U.S. College and University Missions*, 158 Rsh. Dialogue (March 2020).

¹⁹⁵ Blockchain Initiative, <https://www.mcombs.utexas.edu/centers-and-initiatives/blockchain/> (last visited May 9, 2022).

A few course offerings do not adequately prepare students to contribute to the business and development roles of companies operating in the incredibly nuanced and sophisticated blockchain/cryptocurrency space.

Online Education

As tech firms drop degree requirements for certain positions, online options such as those offered through Massive Open Online Course (“MOOC”) platforms, like Coursera and edX, widen the applicant pool to those who may not be able to afford the rising cost of traditional higher education.¹⁹⁶ For example, “Fintech – The Future of Finance” certificate, is the edX version of a similar class taught at UT Austin, which serves as an introductory course for fintech, machine learning, and blockchain technology.¹⁹⁷

In addition, the firms benefit as well because diversity in talent is proven to improve economic returns in an innovation ecosystem.¹⁹⁸ Recruiting developers who have learned via different approaches results in an approach that better anticipates issues and produces technology that fits all types of consumers and industries. Universities and tech companies, like Amazon and Alibaba, have even been collaborating to develop initiatives for online educational programs that offer certificates aimed at streamlining students’ path to working within the tech industry.¹⁹⁹

Blockchain is an incredibly novel technology, and because there is not a lot of history to teach, a lot of the best learning experience will be from studies on current events and real-time experimentation. It is in the decentralized nature of cryptocurrency to diversify the approaches to learning and broaden access to both teaching and learning opportunities within the space.

Strengthening educational opportunities across the state will require broad support. To facilitate these efforts Texas should continue to issue grants directed towards work skills and job placement programs,²⁰⁰ and youth educational opportunities directed towards STEM.²⁰¹

Recommendations

1. Texas should create more robust privacy protections for student data, clear disclosures of the practices and a reasonable range of opt-out rights, including prioritizing student and parent ownership of data.

¹⁹⁶ *Why More Tech Companies are Dropping Degree Requirements When Hiring*, CODECADEMY (Dec. 22, 2021), <https://www.codecademy.com/resources/blog/why-more-tech-companies-are-dropping-degree-requirements-when-hiring/>.

¹⁹⁷ Professional Certificate in FinTech: The Future of Finance, <https://www.edx.org/professional-certificate/utaustinx-fintech-the-future-of-finance>, (last visited May 17, 2022).

¹⁹⁸ Bussgang, Montuori & Brah, *supra* note 133.

¹⁹⁹ Chlsea Toczauer, *Is Partnership Between Elite Universities and Big Tech Inevitable?*, ONLINE EDUCATION <https://www.onlineeducation.com/features/big-tech-and-elite-schools> (last visited Nov. 5, 2022).

²⁰⁰ Press Release, Office of the Texas Governor, *Governor Abbott Announces More Than \$5.9 Million in Texas Talent Connection Grants* (July 7, 2022), <https://gov.texas.gov/news/post/governor-abbott-announces-more-than-5.9-million-in-texas-talent-connection-grants>.

²⁰¹ Press Release, Office of the Texas Governor, Governor Abbott, *TWC Award Almost \$1.3 Million in Governor’s Summer Merit Program* (July 7, 2022), <https://gov.texas.gov/news/post/governor-abbott-twc-award-almost-1.3-million-in-governors-summer-merit-program>.

2. In order to ensure maximum privacy of student data and to ensure said data is owned by students and parents, Texas should encourage education technology providers to use open technology standards for student records.
3. The Work Group encourages the Legislature to adopt a resolution supporting educational initiatives related to blockchain technology.

AREAS OF BLOCKCHAIN-RELATED ECONOMIC GROWTH OPPORTUNITIES IN TEXAS

Commercial Law and Contracts

Introduction

In this area, the Work Group focused on the legal framework for i) facilitating *transactions* using blockchain technology involving commercial and non-profit entities, governmental instrumentalities, and individuals; and ii) recognizing *property rights* in digital assets maintained on a blockchain and facilitating transactions involving those rights. Outside the scope of this portion of the Report are blockchain-related legal issues such as identity management, the need for new types of juridical entities, and the need for more or less regulation of blockchain-related activities to protect the privacy of the citizens (individual or juridical) of Texas. Some of these topics are addressed in other portions of this Report.

Existing Texas laws (statutes, regulations, interpretations by regulators, and court decisions) provide legal recognition, support, and enforcement for many blockchain-related transactions. There are, however, some types of transactions currently being conducted or reasonably anticipated where the existing legal framework either does not apply, applies but yields inappropriate results, or there is doubt about its applicability. These types of transactions are discussed below in this portion of the Report. These gaps in the legal framework can hinder the development of blockchain enabled transactions. For this reason, the Work Group recommends to the Legislature: a) to not unsettle existing law by enacting amendments that may have unintended consequences, b) target specific areas of the law identified below to fill gaps or remove uncertainty, and c) educating the public, with a focus on the legal community, of the existing legal framework and how the recommended legislative changes will fill the gaps.

Background: Existing Law Supports Blockchain Transactions

1. The ESIGN / UETA Foundation

As have 48 other states and the District of Columbia (NY being the exception²⁰²), Texas has enacted the Uniform Electronic Transactions Act²⁰³ (“UETA”). In 1999, the Uniform Law Commission (“ULC”) approved UETA for consideration by the various states to ensure that electronic signatures, electronic records, and contracts based on or memorialized in electronic formats would not be rejected merely because of their electronic nature, for example, under a narrow reading of “writing” under state statutes of frauds. As the Prefatory Note to UETA states:

It is important to understand that the purpose of the UETA is to remove barriers to electronic commerce by validating and effectuating electronic records and

²⁰² New York’s non-uniform electronic records and signature law is generally consistent with UETA and the federal ESIGN law.

²⁰³ Texas Business and Commercial Code Sections 322.001 and following.

signatures. It is not a general contracting statute—the substantive rules of contracts remain unaffected by UETA.

In 2000, the federal Electronic Signatures in Global and National Commerce Act (“ESIGN”) was enacted. ESIGN is very similar to UETA, but did add certain consumer consent provisions. ESIGN specifies that a state’s enactment of UETA in the form in which it was promulgated by the ULC supersedes the related provisions of ESIGN. ESIGN further provides that state electronic signature and electronic record laws which are not enactments of UETA may avoid federal preemption if they are consistent with ESIGN, do not require or provide greater legal effect to any specific technology or technical specification, and specifically mention ESIGN if enacted after the effective date of the federal law. States that modify their enactment of UETA run the risk of those modifications being preempted by ESIGN. Texas and all the other states (other than California and New York) have enacted UETA as their state laws in substantially the form promulgated by the ULC. For purposes of this Report, that uniformity includes California and New York as well.

While there are minor phrasing differences between the relevant provisions of UETA and ESIGN, the commonality between the acts and the reverse preemption provision of ESIGN work in tandem to provide a fairly uniform national statutory framework in the area of electronic records and signatures supporting a wide range of transactions. For purposes of this Report, the differences between ESIGN and UETA are not material or relevant because the analysis of the enforceability of transactions using blockchain technology and “smart contracts” would lead to identical conclusions.

Neither blockchain technology nor smart contracts are new concepts. A blockchain-based smart contract is not necessarily, as the name suggests, a legal contract. Rather, the term refers to a set of computer code that is designed to generate instructions upon the satisfaction of certain conditions.²⁰⁴ For example, computer code that is capable of determining whether a certain amount of funds have been received and upon such confirmation that code generates instructions, such as the release of a confirmation of receipt, would be a smart contract. The conditions to be satisfied and the resulting instructions may be simple (think of a vending machine) or complex (think of instructions to generate shipment of products, whether tangible or intangible).

UETA and ESIGN provide legal support for a broad range of electronic transactions, including those using blockchain technology. Both ESIGN and UETA include broad definitions for electronic signatures and records and both bodies of law are technology neutral.

Both ESIGN and UETA also give full legal recognition to the use of computers to act on behalf of persons (individuals or legal entities). These are referred to as electronic agents in the statutes and sometimes as “bots,” short for electronic robots, in the vernacular. Electronic agents, or bots, can be the tools used to operate smart contracts using blockchain technology.

²⁰⁴ See A (VERY SHORT) TECHNOLOGY PRIMER, *supra*.

2. Risks of Attempting to Supplement or *Clarify* Texas’s UETA: Lessons from Other States’ Attempts to Expand the ESIGN / UETA Legal Foundation

As explained above, ESIGN and UETA provide a broad, solid legal foundation for blockchain-related transactions. As discussed further below, where there is a need to supplement the ESIGN/UETA legal foundation for blockchain transactions, the proposed 2022 amendments to the Uniform Commercial Code will provide those supplements. For this reason, the Work Group recommends that the Legislature not attempt to otherwise supplement or clarify Texas’s enactment of UETA as some other states have done or considered. Such attempts to supplement or clarify are more likely to create ambiguity in the existing legal foundation. Ambiguity creates uncertainty in the market and if Texas creates some uncertainty in the full legal recognition of blockchain-related transactions because of questions of the scope of the Texas enactment of UETA and its interplay with ESIGN, this could have the unintended consequence of blockchain market participants choosing a state without that uncertainty.

Some proposed and enacted legislation has simply provided that blockchains or a smart contract be considered electronic signatures or records within the state’s UETA and thus not be denied enforceability because of their electronic nature. This is redundant because UETA and ESIGN already provide for this result. When considered in combination with the issue of inconsistent, and at times, technically narrow or incorrect, definitions discussed below, the complications posed by redundant legislation become quite clear. In particular, there are many variants of blockchain technology and it is likely that new ones will be developed over time. If one or more of those variants do not fall within the definition of “blockchain technology” enacted as an amendment to UETA, then arguably smart contracts deployed on top of those protocols do not enjoy the protective presumptions of UETA. Given that the technology-neutral approach currently taken by UETA (as does ESIGN, think preemption provisions in ESIGN) is broad enough to encompass blockchain technologies in its many variations, the result of enacting blockchain-specific amendments to UETA provisions is actually a significantly worse outcome for blockchain-based businesses.

Some of the proposed legislation contains definitions of either blockchain or smart contracts that are stated differently or are sometimes conflicting. Different attributes of blockchain technology have been advanced in public discourse. Definitions in legislation introduced in various states differ from those of industry groups and from each other. Rather than make these jurisdictions blockchain-friendly for start-ups and entrepreneurs, the variances in definitions actually introduce legal uncertainty where it did not previously exist, and invite unnecessary and expensive litigation, or market participants avoiding the states with such variants.

Attempts to supplement or clarify Texas’s enactment of UETA may also result in such extra-UETA provisions being preempted by the federal ESIGN statute for at least two reasons. First, the broad preemption provisions in ESIGN expressly limit how much the states may vary UETA, or risk such variants being preempted. Also, if enough states create too much variation in the fairly uniform legal foundation for blockchain-related transactions, Congress may feel compelled to act with additional federal legislation and without the reverse preemption provision found in ESIGN.

For these reasons, the Work Group recommends that the Legislature not entertain any supplements or clarifications to the Texas enactment of UETA.

3. Electronic Records and rights therein as Collateral- UCC Article 9

Article 9 of the UCC deals principally with how lenders and other financing firms secure their claims in personal property used as collateral for loans and financing transactions. A high level of certainty in how lenders and financiers protect their interests in the collateral for financing transactions, supports an efficient market. With the growth of a category of assets called “digital assets” brings some additional uncertainty in how lenders and financiers fully protect their interests in collateral in this growing category of digital assets.

As discussed below, the same group that promulgated Article 9 of the UCC is recommending improvements to Article 9 to bring additional certainty relating to this growing category of digital assets. For the reasons below, the Work Group recommends that the Legislature consider and enact the amendments to UCC Article 9 and the other amendments discussed farther below.²⁰⁵

4. Rules of Evidence for Electronic Records in Dispute to Enforce Blockchain Deals

Parties to electronic contracts have been enforcing them for over twenty years under the legal framework codified by ESIGN and UETA. The rules of evidence provide clear guidance for parties to meet the admissibility standards for evidence to enforce transactional in electronic form and governed by ESIGN or UETA. Consequently, the Work Group is not recommending any changes to the rules of evidence as a way to improve the legal landscape supporting blockchain-related transactions in Texas.

Substantive Areas for Improvement

1. The Need for Commercial Law Rules Governing Ownership and Leveraging of Digital Assets

The discussion above pertains primarily to the existing legal foundation for *transactions* created or implemented using electronic records and signatures, whether human-initiated or initiated with automation, and whether using blockchain-related technologies or other technology. As explained above, existing Texas law provides adequate legal support for such transactions.

The existing Texas legal framework described above does not, however, adequately address *property rights* associated with *digital assets*, including most importantly ownership and the right to leverage digital assets. For example, a contract conveying ownership of digital artwork, where

²⁰⁵ The Work Group notes that several members of industry and the public provided testimony at the Work Group’s two public hearings that recommended adoption of the 2022 UCC Amendments as promulgated by the Uniform Law Commission and the American Law Institute. See, e.g., The Written Testimony of The Honorable Zach Whiting, Senior Fellow of Technology Policy, and David Dunmoyer, Chief of Staff, Texas Public Policy Foundation (May 20, 2022) [hereinafter “Whiting & Dunmoyer Testimony”]; De Jong testimony, *supra* note 65; Testimony of Joe Kelley, CEO of Unchained Capital (May 20, 2022); Testimony of Scott Beck, CEO of UTB Financial Holdings, Inc. and Director at United Texas Bank (Aug. 19, 2022). The Work Group further notes the importance of uniformity with respect to the UCC, and that as of the date of this report, the following states have already adopted the 2022 UCC Amendments: Iowa, Indiana, Nebraska, and New Hampshire.

the contract is in electronic form and electronically signed, can be completely enforceable under existing Texas law. What is not clear under current Texas law is whether the purchaser of that digital artwork takes title of that digital artwork free and clear of all prior property claims in that digital artwork. Moreover, current Texas law is not clear with regard to how the owner of that digital asset can use that digital asset (the artwork) as collateral in a financing arrangement. This uncertainty results in the owner of that digital asset not having a vitally important aspect of ownership- the ability to use the asset as collateral for a range of financing transactions.

To remedy these deficiencies, the Work Group recommends that the Legislature consider and adopt the 2022 Amendments to the Uniform Commercial Code (UCC) as promulgated and recommended by the sponsors of the UCC, the Uniform Law Commission and the American Law Institute. A more detailed explanation of the problems and how the Amendments to the UCC solve them is set out below.

2. Gaps in Existing Law Related to Property Rights in Digital Assets

Digital assets are a distinct form of intangible personal property, and it can be challenging to determine who owns or otherwise has rights in them. Existing commercial rules and principles do not provide the certainty for transactions involving digital assets that they provide for assets such as goods, negotiable instruments, securities, etc. The legal regimes applicable to these other areas have developed over time, but digital assets are a new type of property and the law applicable to them is developing as their use proliferates. One of the primary sets of commercial laws in the U.S., the Uniform Commercial Code, does not yet adequately address holding, transferring, and leveraging digital assets, although a proposed set of amendments discussed below will remedy this omission. As noted above, ESIGN and UETA give full legal recognition to contracts entered into and signed using electronic means do not fully address key property rights in digital assets.

Compounding the problem, UCC Article 9 (which contains well developed rules for the use as collateral of all types of personal property) lumps digital assets into the catchall category “general intangibles” with various other assets. The rules governing how lenders fully protect their interest in digital assets provided as collateral for loans given do not comport at all with the practical realities of financing secured by digital assets. The market in Texas needs greater certainty in how parties can confidently use digital assets as collateral in financing transactions.

The solution is for digital assets to have their own separate UCC article, which would contain definitions and rules for holding and transferring digital assets. The new article would provide that a good-faith purchaser of a digital asset for value and without notice of an adverse property claim, even an ownership claim, takes ownership of the digital asset free of that claim. The new article would parallel the rights and concepts under the exiting UCC while at the same time recognize unique aspects of digital assets. With this separate article in place, existing Article 9 of the UCC, which deals with the leveraging of personal property (i.e., the use of personal property as collateral for an obligation), will be amended to facilitate the leveraging of the digital assets covered by the new article.

The Solution: The 2022 Amendments to the Uniform Commercial Code (UCC)

The 2022 Amendments to the UCC are designed to fill the gaps described above. These Amendments were drafted by a committee of the Uniform Law Commission and the American Law Institute. These are the groups that developed the UCC originally and have kept it current by tapping into the experience of hundreds of expert advisors from all sectors of the economy. The Amendments specifically address important property rights in digital assets, including how digital assets may be held and transferred, and how they may be used as collateral for financing transactions.

The Amendments:

- Create a class of digital assets—defined as “controllable electronic records” (“CERs”)—which include certain virtual currencies, non-fungible tokens, and digital assets in which specified payment rights are embedded. The Amendments provide for a CER to be in effect negotiable, *i.e.*, capable of being transferred in a way that cuts off competing property claims to the CER (a “take-free” rule similar to the existing UCC rule for securities);
- Create rules for holding and transferring CERs based on the concept of “control,” which can be easily accomplished using blockchain technology. A person in control of a CER has essentially the same rights as a person in possession of a physical asset – the right to take advantage of the CER’s benefits, the right to prevent others from taking advantage of the CER’s benefits, and the right to transfer the CER’s benefits to another person. For example, a person holding a virtual currency in a blockchain-based wallet will have control of the virtual currency and the rights referenced above;
- Provide for a security interest in a CER to be perfected by control or by the filing of a financing statement, and for a security interest perfected by control to have priority over a security interest perfected merely by filing; and
- Address many other important legal issues key to bringing greater certainty to the markets engaging in transactions involving digital assets, which often are supported by blockchain technology.

The legal regime that the Amendments create for holding, transferring, and leveraging digital assets (CERs in the language of the Amendments) will provide markets in which transactions involving digital assets occur with a high level of certainty. This will stimulate economic activity that would not otherwise occur. Digital assets play an increasingly important role in our economy, and it is critical for their use to be facilitated by a set of clear, predictable, and well-functioning commercial-law rules.

Recommendations

1. Consider and enact the proposed 2022 Amendments to the UCC dealing with technological changes, including a new Article 12 and amendments to Article 9.

These enactments will give full legal recognition to digital assets as a type of personal property and will protect such traditional property rights as the right to own free and clear of conflicting property claims, the right to assign as collateral for obligations, and the right to sell. Adoption of the 2022 Amendments to the UCC was supported by a number of those providing testimony to the Work Group at its public hearings on May 20, 2022, and August 19, 2022.

2. To avoid creating ambiguity in the emerging blockchain marketplace in Texas, the Legislature should not supplement or attempt to clarify Texas's earlier enactment of the Uniform Electronic Transaction Act, which gives full legal recognition to electronic records, electronic signatures, and the use of automation to complete transactions electronically.

Digital Identity

Introduction

The Bitcoin Network laid the groundwork for a new peer-to-peer internet. In the same way that blockchain technology can be used to validate financial transactions, it can also be used to validate identity data. The use of new open digital identity standards, Verifiable Credentials (“VCs”), Decentralized Identifiers (“DIDs”), and Personal Data Stores (“PDSes”) ensure that identity data can be issued, stored, shared, and verified in a user-controlled, privacy-maximizing way, even if blockchain technology is used as a highly tamper-resistant verification layer.

The use of BTC, VCs, DIDs, and PDSes together lay the groundwork for self-sovereign identity (“SSI”), a form of digital identity in which users have control over their personal data by design and default. As governments and corporations continue to increase digital surveillance over individuals and groups, our liberty and democracy are placed seriously at risk. The most meaningful way to combat the surveillance economy is by building new technologies that prevent it. The State of Texas should embrace its tradition of individual liberty by embracing self-sovereign identity; by making it explicit that the U.S. Constitutional protections against unreasonable search and seizure extend to activity on the internet; and by incentivizing companies that are building software for the self-sovereign, peer-to-peer economy to headquarter in Texas.

Background

Not long after the development of the Bitcoin Network²⁰⁶ technologists discovered that the same blockchain data structure used to verify the ownership of cryptocurrency could be used to verify any claim—including claims made about people. In this way, digital identity applications of blockchain technology were born.²⁰⁷ For example, a person’s date of birth, full name, age, or alma mater can be verified against a distributed ledger, ensuring the integrity of the data and making identity fraud and forgery much more difficult. This creates value throughout the digital economy, as it precludes both the need to pay high fees to verify claims and the need to repeatedly verify information that has already been validated once against a blockchain.

From the beginning, privacy was an overriding consideration for any identity use case employing blockchain technology. It was critical to not record any human-readable data directly on a blockchain ledger, as the ledger cannot be changed—and, if it is a public ledger, it is potentially visible to anyone. In 2015, a Texas startup, Learning Machine, partnered with MIT to solve this problem. They developed Blockcerts,²⁰⁸ an open source, open technical standard that used hashing

²⁰⁶ See A (VERY SHORT) TECHNOLOGY PRIMER, *supra*.

²⁰⁷ Natalie Smolenski, *Blockchain for Education: A New Credentialing Ecosystem*, OECD DIGITAL EDUCATION OUTLOOK 2021 (June 2021), https://read.oecd-ilibrary.org/education/oecd-digital-education-outlook-2021_589b283f-en#page211.

²⁰⁸ Blockcerts, <https://www.blockcerts.org/>. The Blockcerts open standard is not to be confused with BlockCerts (www.BlockCerts.com), a private blockchain and token project launched by Canadian entrepreneur Tim Vasko. Vasko’s project is in no way affiliated with Blockcerts.

functions to permanently scramble data. These hashes were then hashed (scrambled) with other hashes of other data, resulting in a “root hash” that was “anchored” to Bitcoin in the OP_RETURN field of Bitcoin transactions.²⁰⁹ In this way, it became virtually impossible to reconstruct any of the identity data anchored to Bitcoin. However, hashes *can* be compared to other hashes—and if the hashes match, the data they have scrambled can be “blindly” verified to be accurate. In this way, Learning Machine and MIT created a fully private way of verifying identity data against a public blockchain.

Meanwhile, the human-readable data (for example, a PDF of a birth certificate) was stored off-chain on personal devices, like laptop or phone hard drives or personal cloud drives, or in organizational databases owned by the issuers of the data (for example, in a University’s Student Information System). This enabled both issuers and recipients of identity data to exert greater control over when and how that data was shared and verified.

Blockcerts launched in 2016, and it made the verification of digital claims an open source software service rather than a paid vendor service. This moved the identity industry toward a paradigm that had come to be called “self-sovereign identity” (“SSI”).²¹⁰ Self-sovereign identity is a term frequently used to describe digital identity standards and applications that place control of identity data in the hands of the user, with minimal or no reliance on third parties.²¹¹ In the same way that Bitcoin decentralized the ownership of digital money by enabling direct custody and peer-to-peer transacting of digital assets, self-sovereign identity enabled direct custody and peer-to-peer sharing of digital identity claims.

After the introduction of Blockcerts in 2016, the self-sovereign identity industry evolved quickly. A community of technologists from many companies, governments, and educational institutions converged on the open source development processes overseen by the W3C, a nonprofit consortium founded by Tim Berners-Lee, CERN, DARPA, and the European Commission in 1994.²¹² The W3C maintains the free, open source open standards that underpin the World Wide Web, including HTTP, HTML, and URIs.²¹³ Its leadership quickly realized that verification of digital claims should benefit from the same transparent, open source development processes as these other web standards. This would prevent digital identity from being “captured” by any one company or government and create a level technical playing field for future industry.

A Credentials Community Group was formed at the W3C in 2017,²¹⁴ and soon it incorporated and built upon the work already done with Blockcerts into a new technology standard: Verifiable

²⁰⁹ *Quick Start*, BLOCKCERTS.ORG, <https://www.blockcerts.org/guide/quick-start.html>.

²¹⁰ Allen, Christopher, *The Path to Self-Sovereign Identity*, LIFE WITH ALACRITY (Apr. 25, 2016), <http://www.lifewithalacrity.com/2016/04/the-path-to-self-sovereign-identity.html>.

²¹¹ Natalie Smolenski, *Identity and Digital Self-Sovereignty: A New Paradigm for Sovereignty on the High Seas*, MEDIUM (Sep. 19, 2016), <https://medium.com/learning-machine-blog/identity-and-digital-self-sovereignty-1f3faab7d9e3>.

²¹² *History*, FACTS ABOUT W3C, <https://www.w3.org/Consortium/facts#:~:text=In%20October%201994%2C%20Tim%20Berners,DARPA%20and%20the%20European%20Commission> (last visited July 22, 2022).

²¹³ *Standards*, W3C, <https://www.w3.org/standards/> (last visited July 22, 2022).

²¹⁴ *Credentials Community Group*, W3C, <https://www.w3.org/community/credentials/> (last visited July 22, 2022).

Credentials (“VCs”).²¹⁵ Verifiable Credentials defines a robust process for issuing, sharing, verifying, and revoking digital claims that may, but does not have to, use blockchain technology. The first version of Verifiable Credentials became an official W3C standard in 2019, while the most recent version was approved in March 2022. The standard continues to rapidly evolve as the digital identity marketplace matures.

As Verifiable Credentials gained steam, another open standard began to be incubated at the W3C: Decentralized Identifiers, or DIDs.²¹⁶ A DID is a unique identifier, like a phone number, email address, or URL, that the person who owns it controls. DIDs are decentralized because no centralized authority (i.e. software company) acts as a verifying authority—instead, blockchains are used to verify DIDs. This makes DIDs a more resilient and user-centric way of verifying digital identity than previous methods. Moreover, because DIDs are a W3C open standard, no one company or government owns the technology. In part for this reason, DIDs have faced pushback from technology companies like Google and Mozilla.²¹⁷

A DID is a string of letters and numbers, so no specific data about an individual (other than the DID itself) can be seen just by looking at a DID. Instead, Verifiable Credentials can be “attached” to DIDs using technological methods defined by the VC and DID standards. The use of DIDs has made it unnecessary to hash any data directly onto a blockchain; instead, the DID is anchored to a blockchain, and the associated VCs are stored off-chain and verified against the DID. People use digital wallets (often smartphone applications) to manage both their DIDs and the VCs issued to them. Wallets make it easy to share, verify, and even revoke access to one’s own digital credentials.

For example, a student might have a DID issued to them by their university, which then issues them VCs attesting to the work they have done at the university. They receive and store those VCs in their wallet, which only they have access to. Those VCs could include the student’s enrollment information, grades, course completions, and any professional licenses or certificates earned during their course of study. When the student’s digital diploma is issued, it is also associated to the student’s DID. Because the student controls their DID through their digital wallet, the student can determine when, how, and with whom any of their educational information is shared—and the student can even revoke access to that data or transfer custody of their data to someone else.

A third open technology standard critical for creating and maintaining an ecosystem for self-sovereign identity is the “Personal Data Store” (“PDS”) or “Personal Data Account” (“PDA”).²¹⁸ A PDS or PDA enables individuals or organizations to confidentially store and share data about themselves. This data may include digital identity data as well as cryptocurrency or other digital assets. Some implementations of PDSes have been referred to as “self-hosted wallets” because

²¹⁵ *Verifiable Credentials Data Model v1.1*, W3C, <https://www.w3.org/TR/vc-data-model/> (last visited July 22, 2022).

²¹⁶ *Decentralized Identifiers (DIDs) v1.0*, W3C, <https://www.w3.org/TR/did-core/> (last visited Nov. 5, 2022).

²¹⁷ Claburn, Thomas, *W3C overrules objections by Google, Mozilla to Decentralized Identifier Spec*, THE REGISTER, (July 1, 2022), https://www.theregister.com/2022/07/01/w3c_overrules_objections/.

²¹⁸ *Confidential Storage 0.1*, DECENTRALIZED IDENTITY FOUNDATION, (Aug. 12, 2021), <https://identity.foundation/confidential-storage/>.

they do not rely on any third-party software provider for hosting and access. Some jurisdictions have moved to ban self-hosted wallets, which this report recommends against below.²¹⁹

The Decentralized Identity Foundation (“DIF”), in partnership with the W3C, has developed an open source, open technology standard, “Confidential Storage”, to facilitate the building of interoperable and private PDSes. The DIF notes that Confidential Storage is “a privacy-respecting mechanism for storing, indexing, and retrieving encrypted data at a storage provider. It is often useful when an individual or organization wants to protect data in a way that the storage provider cannot view, analyze, aggregate, or resell the data. This approach also ensures that application data is portable and protected from storage provider data breaches.”²²⁰

Because Confidential Storage is an open source, open standard, any company or government can use it to develop PDSes that are interoperable with others that also use the standard. This enables an ecosystem of data portability for end users while minimizing risk for the software provider, who is now protected against breaches of their users’ data.

In short, DIDs, VCs, and PDSes enable an entirely new degree of user control over personal data that begins to lay the groundwork for truly self-sovereign digital identity. When used in combination with public blockchain networks like Bitcoin, they become even more powerful, because verification can be achieved using an open network without disclosing any personal information on the ledger. These technologies together create a disruptive paradigm shift: rather than a software platform owning user data and “lending” it to the user, the user owns their data and “lend” it to software platforms.

These new standards do not replace all digital identity technologies used today, but they are becoming increasingly widespread as users demand more privacy and control online while companies race to build commercial software applications that make use of them.

Key Issues for Blockchain-Related Economic Growth in Texas

In the 1990s, the launch of HTTP, SSL, and other open standards created a shared infrastructure that enabled private messaging and e-commerce using the public infrastructure of the internet.²²¹ This gave birth to the “Web 2.0” revolution, characterized by the growth of today’s largest software companies—Google, Amazon, Apple, Meta, and Microsoft—and a renaissance of innovation in hubs like Silicon Valley and across the wider world. Web 2.0 was characterized by user-generated content (“UGC”), meaning that static websites were increasingly replaced with responsive sites in which communication was generated and marketplaces were populated by users.²²² This propelled software platforms that acted as “forums” for UGC—social media websites,

²¹⁹ Jack Schickler, *EU Parliament Passes Privacy-Busting Crypto Rules Despite Industry Criticism*, COINDESK (Mar. 31, 2022), <https://www.coindesk.com/policy/2022/03/31/eu-parliament-votes-on-privacy-busting-crypto-rules-industry-rails-against-proposals/>.

²²⁰ DECENTRALIZED IDENTITY FOUNDATION, *supra* note 218.

²²¹ Tim Matthews, *The Origins of Web Security and the Birth of Security Socket Layer (SSL) Protocol*, EXABEAM (Feb. 6, 2019), <https://www.exabeam.com/information-security/web-security-security-socket-layer-protocol-ssl/>.

²²² *User-Generated Content*, WIKIPEDIA, https://en.wikipedia.org/wiki/User-generated_content (last visited July 26, 2022).

marketplaces like Ebay and Amazon—to extraordinary heights of revenue as they captured millions or even billions of users around the world.

But the success of Web 2.0 also introduced a problem: the internet was supposed to be a place of free, peer-to-peer transacting. Instead, it became highly mediated by platform companies. These companies not only collected data on all their users, but monetized it in two main ways: 1) by using it to serve users highly targeted, personalized ads; and 2) by directly selling user data to advertisers, governments, credit reporting agencies, political campaigns, and other third parties. This exponentially-growing trove of user data provided a growing opportunity for technology companies, often in partnership with governments and political parties, to control behavior at scale by strongly influencing purchasing and investment decisions, voter turnout, political views, and daily habits.²²³

Mostly troublingly, these huge datasets are also now being used to inform machine learning algorithms that predict human behavior before it happens—with the result that some countries are beginning to punish “pre-crime” (crime that has not yet happened).²²⁴ It is easier than ever to make access to basic human needs like access to food, travel, housing, education, and other aspects of daily life conditional on “good behavior”—however that is defined by authorities.²²⁵ In the United States, these encroachments on privacy and liberty have been aided and abetted by a lack of policy and legal guidance unambiguously extending Constitutional protections against unreasonable search and seizure to the digital realm. Even internet privacy legislation, such as the California Consumer Privacy Act (“CCPA”), is largely written so that it does not meaningfully impact software companies’ ability to monetize user data.²²⁶ For example, companies have used “IP protection” as a heading under which to largely conceal from the public their practices of data collection and usage. No jurisdiction wants to be tarred and feathered politically as “bad for business” by declaring that trafficking in personal data is severely circumscribed. Therefore, while privacy regulation may create some general awareness about privacy and penalties for the most egregious data breaches, it does little to change the business models—and the associated benefits for governments—that have created the underlying problem.

This web of what has been called “surveillance capitalism”²²⁷ is intensifying with each passing week as technology advances, software commodifies, and big datasets get exponentially bigger. This gives rise to urgent questions about the future of basic human liberties and the very possibility of self-governing societies. Is democracy even possible if every movement, statement, and preference of every person in that society is permanently recorded and potentially monetized in a

²²³ SHOSHANA ZUBOFF, *THE AGE OF SURVEILLANCE CAPITALISM: THE FIGHT FOR A HUMAN FUTURE AT THE NEW FRONTIER OF POWER* (2019).

²²⁴ Tim Lau, *Predictive Policing Explained*, THE BRENNAN CENTER FOR JUSTICE (Apr. 1, 2020), <https://www.brennancenter.org/our-work/research-reports/predictive-policing-explained>; Paul Mozur & Aaron Krolik, *A Surveillance Net Blankets China’s Cities, Giving Police Vast Powers*, THE NEW YORK TIMES (Dec. 17, 2019), <https://www.nytimes.com/2019/12/17/technology/china-surveillance.html>.

²²⁵ Paul Mozur, *Inside China’s Dystopian Dreams: A.I., Shame and Lots of Cameras*, THE NEW YORK TIMES (July 8, 2018), <https://www.nytimes.com/2018/07/08/business/china-surveillance-technology.html>.

²²⁶ California Consumer Privacy Act (CCPA), <https://oag.ca.gov/privacy/ccpa>.

²²⁷ ZUBOFF, *supra* note 223; Surya Mattu & Kashmir Hill, *The House that Spied on Me*, GIZMODO (Feb. 7, 2018), <https://gizmodo.com/the-house-that-spied-on-me-1822429852>.

prediction market? Does freedom meaningfully exist in a society where algorithms “nudge” groups of people—large and small—to take specific actions that primarily benefit those deploying the algorithms? And will the people themselves be complicit in this erasure of their liberties and ability to self-govern?

Today, a growing chorus of people around the world are calling for an internet where user data no longer belongs to software companies, but to the users themselves. This does not mean treating personal data as “property” in the traditional sense, but rather as an inseparable element of the human dignity and bodily integrity of individuals. Recognizing this “sphere of privacy,” which is also a sphere of human dignity, requires a move toward decentralization—pushing data ownership, storage, sharing, and verification to the edges of the network (for example, to user-owned digital wallets).²²⁸ The launch of the open standards for digital identity described above—VCs, DIDs and PDSes—has technically enabled this possibility, but much work remains to be done.

As of the writing of this Report, dozens, if not hundreds, of companies—from the smallest startups to Fortune 100s—are incorporating DIDs, VCs, and PDSes into their products and solutions. Many of those companies are either headquartered in, or have significant personnel located in, Texas. The State of Texas therefore has the unprecedented opportunity to spearhead the creation of this new, user-centric Internet by incentivizing software companies with business models that do not rely on the monetization of personal data to locate here. Texas can also create incentives for already-existing businesses to build a self-sovereign internet by embracing self-sovereign identity as in line with Texas values.

Ultimately, the architectures of human freedom will not be legislated first—they will be built first. But legislation can play a critical role in defining the jurisdictions that will be friendliest to this new wave of technological infrastructure. By signaling that Texas welcomes businesses that value digital privacy and human rights, we will capture both the social and the economic benefits of a free society.

The surveillance economy is on its way to being disrupted as next-generation web technologies like DIDs, VCs, and PDSes take hold. Some states, like California, are beginning to mandate the use of these open standards for official government records, like birth and death certificates.²²⁹ Texas can get out in front of this wave by asserting that technology companies that headquarter in Texas and do not derive revenue from monetizing personal data will be rewarded with significant incentives.

²²⁸ Some have referred to the movement to decentralize the internet as “Web 3.0,” but that term also has strong associations with digital token platforms that use blockchain technology in a highly centralized way. It is important to note here that blockchain and decentralization are not the same thing, and many blockchain implementations are wholly owned by companies, governments, or a small number of investors. For this reason, a startup called TBD has recently referred to their work in decentralized identity as “Web 5.0” in a tongue-in-cheek manner. In this report, the Work Group declines to label the movement to return control of personal data to users but rather insist on its necessity for a free and democratic society.

²²⁹ California S.B. 786, “An act to amend Section 103526.5 of the Health and Safety Code, relating to blockchain technology,” https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB786#93ENR.

In the same way that Silicon Valley became the epicenter of Web 2.0, providing nearly one quarter of all venture capital funding in the United States from 2010-2020, Texas should become the epicenter for the next Web by incentivizing a robust ecosystem of companies building the new peer-to-peer internet.

Recommendations

1. Texas should incentivize technology companies whose revenue model does not depend on the monetization of personal data—or whose revenue model actively precludes such data monetization—to headquarter in Texas. The Legislature should further study the best incentivization model to achieve this purpose.
2. The Work Group encourages the Legislature to adopt a resolution affirming the importance of exploring a framework for self-sovereign identity (“SSI”) that would allow individuals to custody data about themselves and decide when, how, and with whom that data is shared.
3. The Work Group encourages the Legislature to adopt a resolution affirming the right of Texas citizens to possess cryptocurrency on their own account, and to not be prohibited from the use of what is commonly, if inaptly, referred to as “self-hosted wallets,” and to affirm the intention of Texas to protect producers of “self-hosted wallet software or platforms and their users from undue interference.

Decentralized Autonomous Organizations

Introduction

A Decentralized Autonomous Organization (“DAO”) is computer software distributed across a “peer-to-peer network, incorporating governance and decision-making rules.”²³⁰ Although a simple DAO can be programed to operate very autonomously, often people participate in the governance and management of DAOs. When a DAO operates a business, participation in governance and management can give rise to certain liability risks. Although this issue is only just now receiving mainstream attention in the wake of the CFTC charges against Ooki DAO,²³¹ legal scholars have been warning of the perils of potential classification as a general partnership and pointing toward limited liability alternatives since 2014.²³² Recently, states have adopted laws to make a path to organizing a DAO as a limited liability entity “clearer.”²³³ As those attempts have met mediocre reception by industry, industry itself proposed other approaches.²³⁴ The Work Group considered the academic literature, the recent legislative activity, and the recent public discussion of limited liability entities for DAOs in order to craft carefully targeted recommendations that provide clarity to DAO developers on specific issues without interfering with the long-standing success and legal certainty enjoyed more broadly by all businesses who rely on the Texas Business Organizations Code.

Background

In May 2018, Vermont signed into law the first ever blockchain-specific business organization statute, which created a specialized entity called the “blockchain-based limited liability company” or “BLLCs.”²³⁵ The Vermont law permits a DAO to form as a BLLC if it “(1) specifically elect[s] to function as [a] BLLC in their articles of organization, and (2) satisfy specific legislative requirements.”²³⁶ Notably, the law allows BLLCs to build part of its governance structure on blockchain technology and to “implement any reasonable algorithm to validate records, requirements, processes, and procedures for conducting its operation.”²³⁷ Although

²³⁰ ALLEN & OVERY LLP, *DECENTRALIZED AUTONOMOUS ORGANIZATIONS 2* (2016).

²³¹ Complaint, *CFTC v. Ooki DAO*, 3:22-cv-5416 (N.D.CA. Sept. 22, 2022), available at <https://www.cftc.gov/media/7681/enfookicomplaint092222/download>.

²³² See, e.g., Sean Bayern, *Of Bitcoins, Independently Wealthy Software and the Zero-Member LLC*, 108 NW. U.L. REV. 1485 (2014); Sean Bayern, *The Implications of Modern Business-Entity law for the Regulation of Autonomous Systems*, 19 STAN. TECH. L. REV. 93 (2015); Sean Bayern, *Company Law and Autonomous Systems: A Blueprint for Lawyers, Entrepreneurs, and Regulators*, 9 HASTINGS SCI. & TECH. L. J. 135 (2017); Carla L. Reyes, Nizan Geslevich Packin & Benjamin Edwards, *Distributed Governance*, 59 WM. & MARY L. REV. ONLINE 1 (2017); Carla L. Reyes, *If Rockefeller Were a Coder*, 87 GEO. WASH. L. REV. 373 (2019); Reyes, *supra* note 8.

²³³ Vermont, Wyoming, Tennessee.

²³⁴ Chris Brummer & Rodrigo Seira, *DAO Strategy and Legal Wrappers*, PARADIGM (June 08, 2022), <https://www.paradigm.xyz/2022/06/dao-strategy-and-legal-wrappers>; David Kerr & Miles Jennings, *A Legal Framework for Decentralized Autonomous Organizations*, <https://a16zcrypto.com/wp-content/uploads/2022/06/dao-legal-framework-part-1.pdf>.

²³⁵ *Vermont Technology Company Creates First Blockchain-Based LLC*, GRAVEL & SHEA (July 2018), <https://gravelshea.com/2018/07/vermont-technology-company-creates-first-blockchain-based-llc>.

²³⁶ *Vermont Blockchain Legislation Status*, FREEMAN LAW, <https://freemanlaw.com/cryptocurrency/vermont-blockchain-legislation-status/> (last visited Oct. 19, 2022).

²³⁷ *Id.*

innovative, fewer companies formed BLLCs than perhaps Vermont envisioned. There is some speculation that this is because the law restricts formation of BLLCs to specific technical architectures, and, in practice, the architectures of the DAOs the law targets can be quite varied.

Wyoming became the next state to attempt to clarify business organization law to accommodate DAOs. Initially, the Wyoming law appeared to attempt to provide clarity for very autonomous DAOs, emphasizing requirements for “algorithmically managed” DAOs to form what the law called a DAO LLC or LAO. The Wyoming law met sharp criticism from industry, despite its creative approach for three primary reasons. First, to clarify the status of algorithmically managed DAOs, Wyoming unintentionally enacted a law that led entrepreneurs to believe a DAO LLC could either be algorithmically managed or member-managed, but not manager-managed. Second, to elect algorithmic management, the law required the DAO LLC to provide the smart contract address for any smart contract involved in managing the DAO LLC in the certificate of formation (a public document). In the first instance, that requirement could require the disclosure of any number of smart contract addresses. In the second instance, many developers of DAOs decried the security problem created by requiring public disclosure of DAO governance code. Third, and last, but not least, a variety of DAOs had already formed LLCs in Wyoming under the existing statute. Those DAOs became concerned that, given the new existence of a special legal entity form, they would need to dissolve and reorganize under the new statute. In light of all of this, Wyoming has revised the DAO LLC law since it was enacted.

Tennessee later enacted a specialized LLC law that largely adopted the Wyoming approach, with a few alterations.²³⁸ In particular, Tennessee adopted the nomenclature Decentralized Organization, or DO, instead of Decentralized Autonomous Organization (DAO), to emphasize that many DAOs involve people in their governance and management. Second, the Tennessee law required a DO LLC to elect either member-management or smart contract-management, heeding the debates that followed the Wyoming law.

Of note to the Work Group is that all of this legislative effort in all three states focuses solely on LLCs of some kind. This artificially reduces the choice of entity options available to DAOs, reducing the ability to innovate in DAO architecture in the long-run. In particular, the Work Group notes that recent industry discussions emphasize a variety of available options, from layered entity structures²³⁹ to unincorporated non-profit associations.²⁴⁰ The Work Group believes it is important to recognize the significant flexibility afforded to entrepreneurs by the Business Organizations Code and not artificially reduce it, particularly when industry is currently exploring creative options that might better suit DAO needs. To that end, the Work Group does not recommend that the Legislature adopt an entity-specific law for DAOs. Rather, the Work Group recommends very targeted changes that would make existing entity options more attractive to DAOs.

²³⁸ TENN. CODE ANN 48-250-101 *et seq.*

²³⁹ Brummer & Seira, *supra* note 234.

²⁴⁰ Kerr & Jennings, *supra* note 234.

The Key Issues for Blockchain-Related Economic Growth in Texas

The Texas Business Organizations Code allows the formation of limited liability business enterprises under very flexible scenarios. With many governance issues rooted in contract, Texas business organization law is designed to give business owners and entrepreneurs flexibility in designing a legal entity that fits their unique needs, sophistication, and risk profile. As a result, it should come as no surprise that DAOs already have registered in Texas under existing law. The ATX DAO, which gave testimony to this Work Group at both the May 20, 2022 and August 19, 2022 public hearings, for example, is organized as a Texas LLC. So, like in Wyoming, it is possible to form limited liability entities for DAOs in Texas under existing law.

However, a few key issues give DAO entrepreneurs heartburn when they consider their risk from business formation issues. First, it is quite natural that DAOs are interested in operating under a form of coded governance. Many are exploring whether and how to simply code the Operating Agreement or Bylaws that would be required if a DAO formed an LLC or a Corporation. Even those that are able to do so, however, are wary of doing so out of fear that a company agreement written in code would be unenforceable as a matter of contract law. As a result, the Work Group recommends targeted changes to the Business Organizations Code that would clarify what the Work Group believes is already the state of the law: that a company agreement can be written in code.²⁴¹ Further, the Work Group encourages the Legislature to expand upon its prior action to enable corporations to keep corporate records via a blockchain-based data management system, and expand that authorization to the use of blockchain technology for the purposes of holding corporate meetings and corporate votes.

Recommendations

1. Texas should clarify business enterprise law to ensure DAOs enjoy a full range of business entity formation options, and are not limited to a single option (in other words, Texas should not create, for example, a specialized version of the LLC).
2. Texas should consider amending the Business Organizations Code § 101.001(1) to clarify that a company agreement of a limited liability company is not unenforceable because part or all of the agreement is written in computer code.
3. Texas should consider amending Business Organizations Code § 6.002 to clarify that “another suitable electronic communications system” may include an “electronic data system” (Bus. Orgs 1.001 (20-a)) alone or in combination with the other technologies listed in that section for the purposes of holding meetings and voting.

²⁴¹ For discussion of the enforceability of computational contracts generally see Harry Surden, *Computable Contracts*, 46 UC DAVIS L. REV. (2012). For a discussion of the enforceability of smart contracts specifically, see Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313 (2017).

Energy

Introduction

Texas abounds with natural resources and entrepreneurial spirit and is a place of pragmatism and opportunity. For generations, Texas has been a global leader in the energy industry and more recently has taken a leadership role in renewables, as well.²⁴² Recognizing Texas' abundant resources, low-regulation environment, business-friendly nature and entrepreneurial spirit, the opportunity presents itself clearly to lean into our differentiated competitive advantages.

A robust mix of energy sources, including renewables, is key to future success in Texas. However, this success cannot come at the expense of energy stability and reliability at an affordable price. Texas is now a leader in wind turbine and solar power, but due to the variability of those resources, proof-of-work mining of bitcoin is the only utility scale demand-response load that can serve to bring these variable sources into smoother operation, which would improve power reliability and grid stability. Due to Bitcoin's proof-of-work's unique ability to use excess power on the grid when available or curtail its demand by powering down when the grid has high demands, grid stability with a renewables mix is likely only achievable with Bitcoin. With ERCOT being a market-driven system, Texas has a unique-among-states opportunity to solve for a broader energy source mix and become a future model for the world.

In other words, Texas is the energy capital of the world. Blockchain technology touches on energy in a variety of ways but the most profound is the synergies between bitcoin mining and energy. Bitcoin miners in Texas are soaking up stranded energy and providing incentives for increased investment in power generation assets while simultaneously strengthening the grid by participating in programs like demand response (DR) and controllable load resource (CLR). In addition to capturing incredible job growth and tax revenue with the influx of bitcoin mining companies, Texas can harness this growing industry to disincentivize the practice of flaring gas and incentivize the growth of power generation including renewables. These positive developments will take place through naturally occurring free market incentive structures, but Texas can accelerate this growth through a growth-oriented tax policy strategy.

Background

Proof-of-work—the consensus mechanism for bitcoin—can be simply explained as a piece of data that requires significant computation (energy) to find. In bitcoin, miners must find a numeric solution, which is determined by a difficulty target, in order to earn the right to validate transactions. The computational power required for bitcoin mining has changed over the years from simple home computers, to Graphic Processing Unit (GPU) systems, and finally to specialized Application-Specific Integrated Circuit (ASIC) systems. These ASICs do one thing and do it very well—they work to process the cryptographic function necessary to mine the next

²⁴² Dan Gearino, *Texas Is the Country's Clean Energy Leader, Almost in Spite of Itself*, INSIDE CLIMATE NEWS, <https://insideclimatenews.org/news/17022022/inside-clean-energy-texas-clean-energy-leader/>.

block in the Bitcoin Blockchain. While these machines may look like a cloud computing server, they are much more rugged in that they can operate in data centers that are not climate controlled.

With their power needs, these systems are placed in different locations where there is cheap power. In Texas, this ranges from remote locations near a single pumpjack that has natural gas that's uneconomical to pipe to market, to wind or solar farms "behind the grid" for when it's not economically viable to sell the power to the grid, to large ERCOT grid nodes where power can be purchased via commercial power purchase agreements. The scale of energy available on a given site sets the upper bound on how much can be mined at that location. Since miners have a natural economic incentive to find lower cost energy sources in various spots, it tends to make the mining capacity on the global Bitcoin Network naturally decentralized and useful for finding pockets of wasted energy due to these natural incentives. For its part, Texas has already seen more than 1,200 megawatts of bitcoin mining come to the state. Brad Jones, the CEO of ERCOT, estimates that by the end of 2023, there could be as much as 5,000 megawatts of bitcoin mining in Texas. Bitcoin mining benefits the grid in several ways. Bitcoin mines incorporate several characteristics that benefit the grid, discussed below:

- Location Agnostic: Bitcoin miners can locate anywhere there is stranded or excess energy; often in rural areas. This also incentivizes more energy generation in that area;
- Flexible Loads: Bitcoin miners can turn off within just a few seconds either as part of ERCOT's ancillary services like demand response or just to sell power back at the spot price; and
- Have A Flat Load Profile: Bitcoin miners have a great load factor and run continuously unless they turn off during times of high-power demand. This helps generators remain profitable since they run off peak as well.

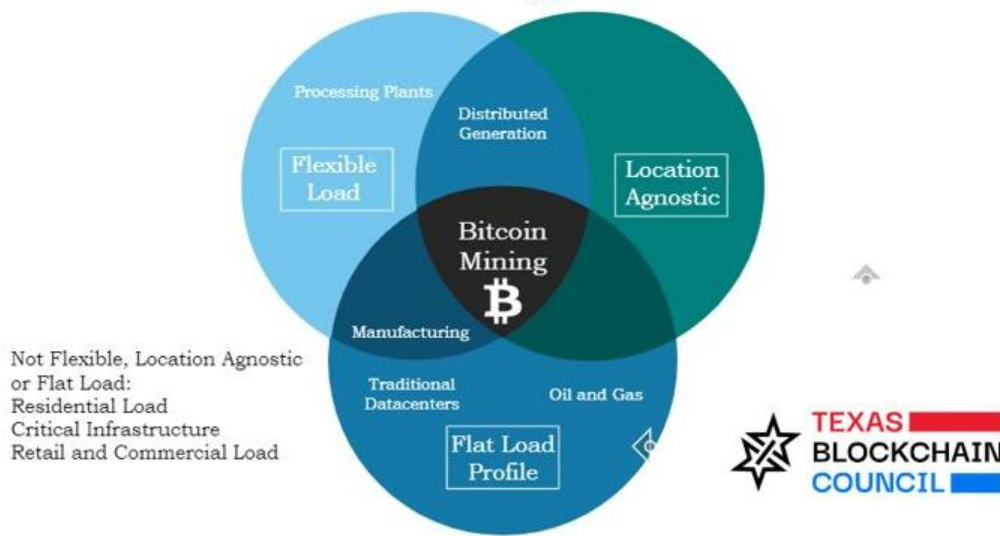
The Key Issues for Blockchain-Related Economic Growth in Texas

The energy required for mining bitcoin is location agnostic, flexible and dispatchable, which incentivizes the use of stranded, wasted, or excess energy capacity (typically the lowest cost energy) in which the miner can serve as a flexible consumer that reduces its own demand in times or circumstances where energy is demanded by higher priority end users. Incentivizing this kind of energy consumer to come to Texas brings great benefits to Texas by way of increased tax revenue, increased incentives for generation, and greater grid stability and resiliency. For example, in the week of July 11, 2022, bitcoin miners in Texas curtailed their load during peak demand on multiple days in response to ERCOT's conservation request. Over 15 bitcoin miners responded with an aggregate of more than 1,000 MWs of load turned off for several hours. That equates to about 1.5% of the Texas grid's power load during peak demand times. In order to obtain a similar effect with supply side battery storage, an investment of over \$1.2 billion dollars in battery storage would have been required (based on average cost of battery storage estimated by the National Renewable Energy Laboratory).

Bitcoin can also be mined using natural gas. Natural gas is used to power a generator that then powers bitcoin mining machines (ASIC computers). This is especially good for the environment when a bitcoin miner and oil and gas operating company re-direct flared gas to mine bitcoin. Flared gas occurs when an oil well hits pockets of gas while extracting oil but there isn't a pipeline to take the gas. In these cases, the operator is forced to vent the gas or flare it. Venting is far worse for the environment, so most operators flare it (burn it on a flare stack). Bitcoin mining can bring an economic incentive to stop flaring by adding a mobile data center at the well site to mine bitcoin. When gas is redirected from a flare to a generator for on-site power, there is a 63% decrease in carbon emissions and a 99% decrease in methane emissions. Currently, oil and gas operators don't pay severance tax to flare gas since there is no sale of the gas. If an operator chooses to sell this wasted gas to a bitcoin miner for on-site power generation, then they have to pay severance tax on the sale of that gas. This tax is disincentivizing an activity that creates jobs, ancillary tax revenue and is better for the environment.

Bitcoin Mining in Texas

Intersection Of Types of Loads



Recommendations

1. Texas should create a severance tax abatement for natural gas that was once flared but is now being consumed on-site.

This incentivizes well operators to sell formerly flared gas to a bitcoin miner who consumes it on site. This environmentally friendly transition from flaring gas to gas usage in a generator also brings jobs and economic activity for rural parts of Texas. This proposal would incentivize operators to stop flaring gas while simultaneously creating economic activity that did not exist

before. The current severance tax incentivizes flaring gas. To be clear, we are not recommending that Texas do away with severance gas entirely but only for specific conditions. Namely, when a formerly flared gas site can be converted to on-site energy consumption.

2. Texas should incentivize controllable loads like bitcoin mining by lessening the tax burden on the purchase of electricity, when it is used to power a bitcoin mine or other large flexible load that participates in ancillary services with ERCOT (as a controllable load or interruptible load). We recommend that this tax incentive be given under the condition that a large flexible load like a bitcoin miner, in a new load category within ERCOT called the large flexible load category or they voluntarily agree to curtail their power usage anytime physical responsive capacity (“PRC”) dips to 3,000 MW PRC.

In order to incentivize more miners to participate as a controllable load within this new category, we recommend that a miner meeting the requirements laid out above pay no taxes on their electricity bill. This is a small cost to taxpayers that will lead to significant benefits for grid reliability at a fraction of the cost of other solutions. We also recommend that miners that participate in the Large Flexible Load category as an interruptible load (as opposed to controllable load) receive a 25% abatement on their electricity charges. While not a beneficial to the grid operator as a controllable load, interruptible loads are still part of the solution to establishing a strong and resilient grid. In short, this is a free market solution to greater grid reliability that will have far lower costs to the taxpayer than batteries or other grid resilience solutions.

Finance

Introduction

One of the foundational principles that emerged with the Bitcoin Network was that in an internet age and digital context, one must still be able to personally control one's own digital property. Texans deserve freedom from always-and-everywhere financial surveillance. This is one area where Texas policymakers and our national representatives must be on the alert for “blockchain” and “cryptocurrency” being co-opted and used to the detriment of the freedoms of Texans.

Background

1. The Connection Between Cryptocurrency Adoption and Industry Growth

Cryptocurrency payments holds significant promise as a practical use of blockchain-based digital assets. However, it remains underutilized, particularly in the area of consumer payments for goods and services. Wider use of these payments would reflect and complement the many other benefits of the cryptocurrency industry in Texas, including job creation, economic growth, and technological innovation.

The widespread adoption of a new payment system, however, is invariably faced with a “chicken and egg” problem in which motivation for merchants and others to adopt the necessary systems and infrastructure await consumer demand for the payment system.²⁴³ That demand in turn is initially absent without the required infrastructure. While the processes and infrastructure needed to accept bitcoin as payments are minimal, a catalyst would certainly accelerate the adoption of this payment option by merchants.

In the payments sector, the growth of the Lightning Network—which allows for near-instantaneous full and final settlement payments settlement on the Bitcoin Network—merchants including well-known global brands like McDonald's, Walmart, and Wendy's are now doing tests and trials to receive bitcoin in their retail point-of-sale systems. Many of these trials are currently taking place outside of the United States, but given Texas' current strength in the Bitcoin Network with regards to mining infrastructure, becoming an important early adopter in payments would afford Texas several knock-on effects, like further startup company formation and job creation.

Recently a clear trend of proliferation of mobile application usage in customer loyalty programs, mobile digital wallets, and digital cards for payments has risen. Now, as cryptocurrency also begins to find its way into our everyday lives, new opportunities arise for entrepreneurs. These opportunities include services companies providing integration services for business networks and infrastructure, as well as employee training and education. All of these could be driven by cryptocurrency payments adoption in Texas itself. As entrepreneurs see an increasing need for software, hardware, and services solutions around emerging financial technology initiatives, Texas

²⁴³ Lyn Alden, *A Look at the Lightning Network*, SWAN BITCOIN (Aug. 5, 2022), <https://www.swanbitcoin.com/a-look-at-the-lightning-network/>.

is poised to realize outsized benefit if those companies are formed and have primary operations here. The opportunity lies in attracting as much of the early adoption activity to Texas as possible.

2. Cryptocurrency as a Reserve Currency for Governments

Sovereign states have begun purchasing cryptocurrency to hold as a reserve currency in their own treasuries.²⁴⁴ Some are specifically making bitcoin legal tender,²⁴⁵ while others are predicting that a long-term appreciation in the value of cryptocurrency will bolster their balance sheets in a high inflationary environment.²⁴⁶

Texas has a history of allocating a portion of the state's reserves to hard assets, like gold bullion: a depository was established in the state in response to the Great Financial Crisis of 2008.²⁴⁷ Certain cryptocurrencies may also be a natural fit for the state's balance sheet. Some Texas cities are already putting bitcoin on their balance sheet, such as Fort Worth has done through mining bitcoin.²⁴⁸ The strong signal for Texas to directly hold an amount of cryptocurrency would be a powerful indicator that Texas' interests are aligned with business operators.

3. Supporting Advances in Payments Technology is Difficult Without Regulatory Clarity at all Regulatory Levels

The Lightning Network enables near-instantaneous fully final payment and settlement on the Bitcoin Network. It is a scaling solution to blockchains, which are slow in processing and finality by their designs. Furthermore, it enables new areas of innovation. Often described as a "Layer 2" technology, the Lightning Network has already been adopted as a payment processing

²⁴⁴ Lucile King, "More Sovereign States Will Feel the Need of Adopting Cryptocurrencies," Says Fidelity Digital, CRYPTOCURRENCY NEWS (Jan 18, 2022), <https://www.cryptocynnews.com/more-sovereign-states-will-feel-the-need-of-adopting-cryptocurrencies-says-fidelity-digital/>.

²⁴⁵ Jonathan Gibson, *El Salvador and CAR: 2 Countries That Made Bitcoin Legal Tender*, USE THE BITCOIN (May 29, 2022), <https://usethebitcoin.com/el-salvador-and-car-bitcoin-legal-tender/>.

²⁴⁶ Maria Andretti, *Bitcoin as a Hedge Against Inflation*, BITCOIN WORLD CAPITAL (July 27, 2020), <https://bwcevent.com/news/bitcoin/bitcoin-as-a-hedge-against-inflation/#:~:text=%20Bitcoin%20Is%20a%20Hedge%20Against%20Inflation.%20During,of%20years%2C%20and%20it%20remains%20the%20case%20today.>

²⁴⁷ Lauren Mulverhill, *The Texas Bullion Depository: Its Timing is Golden*, FISCAL NOTES (Sept. 2017), <https://comptroller.texas.gov/economy/fiscal-notes/2017/september/bullion-depository.php#:~:text=The%20U.S.%20Treasury%20Department%20estimates,Texas%20Bullion%20Depository%20comes%20in..>

²⁴⁸ Sigalos, *supra* note 96

infrastructure by financial technology companies and retail point-of-sale systems manufacturers—including NCR²⁴⁹ and Square²⁵⁰—as well as an increasing host of global retail food chains.²⁵¹

The Lightning Network functions as a server that communicates with other servers by passing packets of encrypted data around until it can be unencrypted by the intended recipient. No custody of assets ever passes to individual nodes, only secure data that is useful only to the final recipient once it is unencrypted. As such, it does not appear that operating a Lightning Network node would cause such an operator to be viewed as a money services business. However, in some sections of the business community there is concern over this risk which regulatory clarity would help to alleviate.

4. Money Service Business Regulation under Federal and Texas Law

Given the relatively recent broader adoption of blockchain and digital assets, the state of digital asset regulation in both in the United States and other countries is relatively immature. While Texas is among the leaders in the U.S. in this area, opportunities exist for further refinement and clarity. When considering whether to carry on activities involving blockchain based digital assets in Texas, there are both Federal and State law considerations. Each is addressed in the following sections.

A. Federal Regulation

The Bank Secrecy Act (“BSA”) and its implementing regulations require Money Services Businesses (“MSBs”) to register with FinCEN by filing a Registration of Money Services Business and renewing the registration every two years.²⁵² Operation of an MSB without the appropriate registration is a violation of federal criminal law.²⁵³ This requirement is distinct from any licensing requirement that may apply under state law in the jurisdiction where a business operates.

The Bank Secrecy Act and its implementing regulations require MSBs to develop, implement, and maintain an effective written anti-money laundering (“AML”) program that is reasonably designed to prevent the MSB from being used to facilitate money laundering and the financing of terrorist activities.²⁵⁴ At a minimum, the AML program should: (a) incorporate policies, procedures and internal controls reasonably designed to assure ongoing compliance; (b) designate an individual

²⁴⁹ Nina Bambysheva, *Strike Announces Shopify Integration, Partnerships with NCR and Blackhawk Bringing Bitcoin Lightning Payments to Major Merchants*, FORBES (Apr. 7, 2022 6:03 PM EDT), <https://www.forbes.com/sites/ninabambysheva/2022/04/07/strike-announces-shopify-integration-partnerships-with-ncr-and-blackhawk-bringing-bitcoin-lightning-payments-to-major-merchants/?sh=6a3a315b52fc>.

²⁵⁰ Jimmy Aki, *Square Crypto Debuts Lightning Network Kit*, Inside Bitcoins (Jan. 22, 2020), <https://insidebitcoins.com/news/square-crypto-debuts-lightning-network-kit#:~:text=The%20Lightning%20Network%20is%20a%20second-layer%20scaling%20solution,Technology%20and%20Bitcoin%20use%20by%20streamlining%20their%20wallets.>

²⁵¹ Bitcoin Daily: Bitcoin Lightning Payments Come to Retail; Rep. McCarthy Eyes Blockchain for Gov’t Efficiency, Transparency, PYMNTS (Mar. 15, 2019), <https://www.pymnts.com/blockchain/bitcoin/2019/lightning-payments-retail-rep-mccarthy-blockchain/>.

²⁵² See 31 U.S.C. § 5330; 31 C.F.R. § 1022.380.

²⁵³ See 18 U.S.C. § 1960(b)(1)(B).

²⁵⁴ See 31 U.S.C. §§ 5318(a)(2) and 5318(h); 31 C.F.R. § 1022.210.

responsible for assuring day to day compliance with the program and Bank Secrecy Act requirements; (c) provide training for appropriate personnel including training in the detection of suspicious transactions; and (d) provide for independent review to monitor and maintain an adequate program.²⁵⁵

As a result, whether a business meets the definition of an MSB is significant as it requires (1) registration with FinCEN; and (2) establishment, implementation, and maintenance of an effective AML program, among other requirements. There are a number of activities that will cause a company to be considered an MSB. In the digital asset space, this typically turns on whether the industry participant is a “money transmitter” under the BSA, meaning an entity engaging in “money transmission services.” “Money transmission services” is defined under the BSA as the acceptance of currency, funds, *or other value that substitutes for currency* from one person and the transmission of currency, funds, *or other value that substitutes for currency* to another location or person by any means.²⁵⁶

(i) FinCEN Virtual Currency Guidance

FinCEN has defined “convertible virtual currency” (“CVC”) as a type of virtual currency that “either has an equivalent value as currency, or acts as a substitute for real currency,” and is therefore a type of “value that substitutes for currency.”²⁵⁷ As a result, it is equivalent to U.S. dollars for the purpose of the definition of “money transmission services” under the BSA. The 2013 Guidance further stated that “transactions denominated in CVC will be subject to FinCEN regulations regardless of whether the CVC is represented by a physical or digital token, whether the type of ledger used to record the transactions is centralized or distributed, or the type of technology utilized for the transmission of value.”²⁵⁸

²⁵⁵ See 31 C.F.R. §§ 1022.210(d).

²⁵⁶ 31 CFR § 1010.100(ff)(5)(i)(A) (emphasis added).

²⁵⁷ See FIN-2013-G0001, Application of FinCEN’s Regulations to Persons Administering, Exchanging, or Using Virtual Currencies (Mar. 18, 2013) (the “2013 Guidance”).

²⁵⁸ See FIN-2019-G001, Application of FinCEN’s Regulations to Certain Business Models Involving Convertible Virtual Currencies (May 9, 2019) (“2019 Guidance”) at 7.

The 2013 Guidance went on to address two categories of participants in virtual currency arrangements: “exchangers” and “administrators.” An exchanger is a person engaged as a business in the exchange of virtual currency for real currency, funds, or other virtual currency. An administrator is a person engaged as a business in issuing (putting into circulation) a virtual currency, and who has the authority to redeem (withdraw from circulation) such virtual currency). The 2013 Guidance states that exchangers and administrators of virtual currencies are money transmitters under FinCEN’s regulations, and therefore are required to register with FinCEN as money service businesses.²⁵⁹

FinCEN has pursued enforcement actions for violations of the BSA against various types of businesses engaged in the exchange of CVCs. The first such action was commenced in 2015 against Ripple Labs and its wholly owned subsidiary XRP II, who were found to have violated the BSA’s registration, program and reporting requirements in connection with sales of Ripple Labs’ virtual currency, XRP.²⁶⁰ Several other enforcement actions followed against exchangers of bitcoins and other CVCs for violations of the BSA’s registration, program, and reporting requirements.²⁶¹

In 2014, FinCEN issued further guidance in response to a letter seeking an administrative ruling from FinCEN regarding whether certain ways of disposing of bitcoins mined by a company would make it a money transmitter under the BSA.²⁶² FinCEN ultimately held that “[t]o the extent that a user mines Bitcoin and uses the Bitcoin solely for the user’s own purposes and not for the benefit of another, the user is *not* an MSB under FinCEN’s regulations, because these activities involve neither “acceptance” nor “transmission” of the convertible virtual currency and are not the transmission of funds...”

While the Mining Guidance was helpful in bringing clarity to activities that most people believe should not be considered “money transmission,” it also left the door open for other questions. In the Mining Guidance, FinCEN stated that a material issue to its conclusion rested on “what the person uses the convertible virtual currency for, and for whose benefit.”²⁶³ FinCEN highlighted that Bitcoin mining imposes no obligation on a Bitcoin user to send mined Bitcoin to any other person or place for the benefit of another.²⁶⁴ FinCEN emphasized that the exemption for mining exists “so long as the user is undertaking the transaction solely for the user’s own purpose *and not as a business performed for the benefit of another.*”²⁶⁵ The Mining Guidance also stated that “[a]ny

²⁵⁹ See *id.*

²⁶⁰ See *In the matter of Ripple Labs Inc.*, Assessment of Civil Money Penalty, FinCEN No. 2015-05 (May 5, 2015).

²⁶¹ See *In the matter of BTC-E a/k/a Canton Business Corporation*, FinCEN No. 2017-03 (July 27, 2017); *In the matter of Eric Powers*, FinCEN No. 2019-01 (April 18, 2019); *In the matter of Larry Dean Harmon d/b/a Helix*, FinCEN No. 2020-2 (October 19, 2020).

²⁶² FIN-2014-R001, Application of FinCEN’s Regulations to Virtual Currency Mining Operations (Jan. 30, 2014) (“Mining Guidance”). While the Guidance did include a footnote indicating that the label applied to the particular process of obtaining a virtual currency (including mining) is not material to the legal characterization under the BSA of the process or of the person engaging in the process, there was no substantive discussion on mining and the related activities that were later addressed in the Mining Guidance.

²⁶³ See Mining Guidance at 2.

²⁶⁴ See *id.*

²⁶⁵ See *id.* (emphasis added).

transfers to third parties at the behest of sellers, creditors, owners, or counterparties involved in these transactions should be closely scrutinized, as they may constitute money transmission.”²⁶⁶

In 2019, FinCEN issued another significant piece of guidance where it addressed the regulatory status of various business models involving convertible virtual currencies. It addressed the regulatory status of hosted wallets, unhosted wallet users and CVC ATMs. It also addressed the regulatory status of decentralized (distributed) applications (“DApps”), a term that refers to software programs that operate on a P2P network of computers running a blockchain platform. In the 2019 Guidance, FinCEN stated that when DApps perform money transmission, the definition of money transmitter would apply to the DApp, the owners/operators of the DApp, or both.²⁶⁷ The question of how a software program complies with the BSA is a topic left unaddressed.

One significant issue that the 2019 Guidance did not squarely address is the status of the Lightning Network, or someone operating a node on that network. One might infer from the collective FinCEN guidance in this area that a node operator could be engaged in money transmission by virtue of accepting and transmitting value to another location or person for a fee. Clarity on this point from FinCEN would be beneficial to those operating, or planning to operate, a Lightning Network node.

B. Texas Regulation

Overall, Texas provides a relatively clear framework around the regulation of digital assets. Thus far the approach in Texas has been responsible and thoughtful, while allowing also allowing space for innovation in the blockchain industry.

Similar to the federal regime, a business that conducts money transmission activities in Texas must be licensed by the Texas Department of Banking and be subject to various requirements including maintenance of a minimum net worth, financial security (e.g. posting of a surety bond) and maintenance of permissible investments.²⁶⁸ A business that is licensed by the Texas Department of Banking as a money service business is also subject to the federal requirements set forth in the preceding section.

Although the Texas Money Services Act (“MSA”) does not directly address the treatment of digital assets, Texas Supervisory Memorandum 1037 issued by the Texas Department of Banking answered many of the open questions on how certain activities involving digital assets would be regulated in Texas.²⁶⁹ The Memorandum made clear that bitcoin and other digital assets are not “money” or “monetary value” under the Texas Money Services Act.²⁷⁰ As a result, activities like selling bitcoin or other cryptocurrency in exchange for fiat currency, exchanging one

²⁶⁶ *See id.*

²⁶⁷ *See* FIN-2019-G001, Application of FinCEN’s Regulations to Certain Business Models Involving Convertible Virtual Currencies (May 9, 2019) [hereinafter “2019 Guidance”].

²⁶⁸ *See* TEX. FIN. CODE ANN. §151

²⁶⁹ Texas Supervisory Memorandum 1037, Tx Dp’t of Banking (Apr. 2019) [hereinafter SM 1037].

²⁷⁰ *Id.* 4.

cryptocurrency for another, or providing cryptocurrency custody or transfer services do not constitute regulated money transmission.²⁷¹

The Memorandum further clarified, however, that certain other activities involving cryptocurrency sales where a party is acting as an intermediary between a buyer and a third-party seller of cryptocurrency can subject such a party to money transmission regulation.²⁷² Such would be the case where the buyer of cryptocurrency sends sovereign currency to the exchanger who holds the funds until it determines that the terms of the sale have been satisfied before remitting the funds to the seller.²⁷³ The exchanger in this case is deemed to conduct money transmission by virtue of receiving the buyer's sovereign currency in exchange for a promise to make it available to the seller.²⁷⁴

5. Consumer Protection

Although the Work Group remains convinced of the promise of the blockchain and cryptocurrency industry and of its importance for Texas, the industry events during the Work Group's tenure make the Work Group especially cognizant of the importance of consumer protection in any new industry, including the blockchain and cryptocurrency industry. The Work Group received testimony highlighting the Terra-Luna collapse and the Celsius and Three Arrows Capital insolvencies, and calling for attention to consumer protection issues in the space.²⁷⁵ The Work Group concurs with this call for attention to consumer protection in a diverse and confusing marketplace, and applauds the diligence of the Texas State Securities Board in rooting out fraud and bad actors. The Work Group believes that to further protect consumers, a program of education and outreach may be required, particularly to highlight the differences in business models and frameworks for assessing risk against promises of outlandish reward.

The Key Issues for Blockchain-Related Economic Growth in Texas

1. Incentivize Adoption with Tax Relief

One way to incentivize use of cryptocurrency for everyday transactions would be through sales tax relief. In Texas, the sales tax code recognizes various tax exemptions in order to support goods and associated interests that are aligned with the public good.²⁷⁶ These range from tax holidays on school supplies, exemptions for certain food products, agricultural products, and timber products. Providing relief from sales tax where payment for goods is made with cryptocurrency would stimulate demand by Texas consumers to seek out merchants that accept them for payment. This would encourage merchants to prepare themselves to accept cryptocurrency as payment.

²⁷¹ *See id.*

²⁷² *See id.*

²⁷³ *See id.*

²⁷⁴ *See id.*

²⁷⁵ Texas Appleseed Written Testimony provided by Ann Baddour, Director of the Fair Financial Services Project and Cat Clopton, Texas Appleseed Legal Fellow (Aug. 19, 2022) [hereinafter "Texas Appleseed Testimony"].

²⁷⁶ Texas Comptroller of Public Accounts, Guidelines to Texas Tax Exemptions, <https://comptroller.texas.gov/taxes/publications/96-1045.php> (last visited Nov. 5, 2022).

The Work Group proposes a two-year retail “sales tax holiday” for retail point-of-sale payments for products and services paid for in this manner. The length of time proposed is due to factors such as the time it would take for merchants to set up the technology integrations required to begin receiving such payments across the state, time for word of mouth to spread, time for users to set up their own payments applications to try it, and to correspond with the legislative cycle in the event that course correction is needed.

Adopting a sales tax holiday for cryptocurrency transactions would also garner other benefits for Texas: individuals and businesses across the country would recognize that Texas is making important strategic moves, which will likely accelerate the relocation of businesses and entrepreneurs aligned with Texas values and ethos.

2. Allow Texas to Use its Expert Discretion as to Whether to Invest in Cryptocurrency

Recognizing that government investment in cryptocurrency may provide certain strategic advantages for Texas, we propose clarifying that cryptocurrency with a certain market cap to be determined in the Legislature’s expert discretion, be an authorized investment permissible for the State to include in the natural mix of its investments in light of applying its discretionary expertise in managing its own sovereign wealth. The Work Group encourages the Legislature to select a market cap of sufficient size to hedge against investment in lesser known and more risky classes of cryptocurrency.

3. Improve Clarity for the Treatment of Stablecoins and Certain Payments Technology Under the Texas Money Services Act

While existing law in Texas is generally responsible and appropriate for the purpose of managing regulatory concerns surrounding digital assets, the guidance related to stablecoins is an area where Texas is an outlier. With regard to stablecoins, an opportunity exists to not only fix what is likely an unintended consequence in the guidance but lead the rest of the country in the regulatory treatment of fully reserved dollar backed stablecoins, as more fully developed below.

Currently, stablecoins are neither defined, nor is their treatment addressed, in the MSA. As use and adoption of digital assets and stablecoins increased, the Texas Department of Banking (“DOB”) issued guidance in order to address the many unanswered questions that arose. The most recent guidance relevant to the treatment of stablecoins is contained in Supervisory Memorandum 1037, originally issued on April 3, 2014 by the DOB and most recently revised on April 1, 2019 (SM 1037). While this guidance is useful in providing answers to certain questions related to stablecoins and virtual currency more broadly, it also leaves other questions unanswered and outlines an inconsistent application of stablecoins as “money” under the MSA.

In SM 1037, the DOB concluded that fully reserved, dollar backed stablecoins that provide the holder with a right of redemption against the issuer would be considered “money” under the MSA. As a result, a business engaged in certain activities related to stablecoins may be deemed to engage

in money transmission²⁷⁷ under Texas law, which would require it to comply with all applicable licensing provisions of Finance Code Chapter 151 and of Title 7, Texas Administrative Code, Chapter 33.

One such requirement relates to the holding of permissible investments. The Texas DOB has taken the position in SM 1037 that while stablecoins are “money” for purposes of being subject to the Provisions of the MSA related to money service businesses, stablecoins do not count as permissible investments. This results in the counterintuitive and unique result of a “double reserve” requirement where regulated entities would need to back stablecoin wallet holdings that they host (which are already backed one for one by the U.S. dollar) with dollar equivalent assets. This result could be fixed by adding fully reserved dollar backed stablecoins to the list of permissible investments in Section 151.309 of the MSA. Such a change would also allow regulated MSBs in Texas to otherwise meet their permissible investment requirements using stablecoin holdings which would be treated the same as U.S. dollar holdings.

A. Lightning Network

With regard to the Lightning Network, there is concern among some network participants, particularly given FinCEN’s broad definition of money transmission services, that an operator of a Lightning Network node could become subject to MSB regulation. FinCEN has stated that “[a]n administrator or exchanger that (1) accepts and transmits a convertible virtual currency or (2) buys or sells convertible virtual currency for any reason is a money transmitter under FinCEN’s regulations, unless a limitation to or exemption from the definition applies to the person.”²⁷⁸ FinCEN’s 2019 Guidance went even further and, among other things, raised doubt as to whether it would consider actors such as Lightning Network node operators to be engaged in money transmission. In that 2019 Guidance, FinCEN stated that when decentralized (distributed) applications (“DApps”), a term that refers to software programs that operate on a P2P network of computers running a blockchain platform, *perform money transmission*, the definition of money transmitter would apply to the DApp, the owners/operators of the DApp, or both.²⁷⁹

While the 2019 Guidance did not squarely address the status of the Lightning Network, or someone operating a node on that network, one might infer from the collective FinCEN guidance in this area that a node operator could be engaged in money transmission by virtue of accepting and transmitting value to another location or person for a fee. The Work Group believes that this would

²⁷⁷ “Money transmission” means the receipt of money or monetary value by any means in exchange for a promise to make the money or monetary value available at a later time or different location. The term: (A) includes: (i) selling or issuing stored value or payment instruments, including checks, money orders, and traveler’s checks; (ii) receiving money or monetary value for transmission, including by payment instrument, wire, facsimile, electronic transfer, or ACH debit; (iii) providing third-party bill paying services; or (iv) receiving currency or an instrument payable in currency to physically transport the currency or its equivalent from one location to another by motor vehicle or other means of transportation or through the use of the mail or a shipping, courier, or other delivery service; and (B) does not include the provision solely of online or telecommunication services or connection services to the Internet. *See* Texas Money Services Act § 151.301(b)(4).

²⁷⁸ *See* 2013 Guidance, *supra* note 257, at 3.

²⁷⁹ *See* FIN-2019-G001, Application of FinCEN’s Regulations to Certain Business Models Involving Convertible Virtual Currencies (May 9, 2019).

be the wrong result for the bitcoin industry and that further guidance from FinCEN stating that a Lightning Node operator is not a money transmitter would be beneficial to the industry.

Under Texas law, we believe that a Lightning Network node operator certainly should not be considered a money transmitter since the Texas Department of Banking has previously stated that a non-stablecoin digital asset is not “money” and as a result “receiving it in exchange for a promise to make it available at a later time or different location is not money transmission.” Furthermore, the Texas Department of Banking also stated that “...*absent the involvement of sovereign currency in a transaction, no money transmission can occur.*” There is no involvement of sovereign currency in the activity performed by a Lightning Network node operator, which essentially involves simply passing encrypted data. In addition, transferring non-stablecoin digital assets does not subject such transferor to money transmission regulation in Texas. As such, a Lightning Network node operators’ activity would not be considered “money transmission” in Texas.

Nonetheless, given the importance of the Lightning Network to the growth of the cryptocurrency industry in Texas, a statement confirming that Lightning Network node operators are not money transmitters may be helpful to certain market participants. This might also encourage dialogue at the federal level so that a similar confirmatory statement might be issued that Lightning Node operators are not Money Service Businesses under the Bank Secrecy Act.

B. This Proposal Solves this Unique Problem Under Current Guidance and Provides an Opportunity for Texas to Lead the Nation in this Area

By adding fully reserved dollar backed stablecoins to the list of permissible investments under Texas Finance Code § 151.309(b), Texas would not only solve this unique “double reserve” requirement created by SM 1037, it would also open up further opportunities to regulated entities that wish to leverage the comparative benefits of blockchain based stablecoins. No other state banking department has yet declared fully reserved dollar backed stablecoins to be a permissible investment (for purposes beyond outstanding transmission obligations in like kind digital assets²⁸⁰). As a result, regulated money service businesses cannot count stablecoins as permissible investments in their required state permissible investment reports.

Fully reserved dollar backed stablecoins are fiscally safe instruments, but also provide the advantage in that stablecoins, including large dollar value amounts, can be transmitted almost instantly, reducing settlement time and administrative inconvenience.

Recommendations

1. Institute a two-year retail sales “tax holiday” for payments made using direct cryptocurrency point-of-sale payments for products and services, subject to a reasonable value cap.

²⁸⁰ See, e.g., N.C.G.S. §53-208.42(17(i) (Definition of “Permissible investments,” “[v]irtual currency but only to the extent of outstanding transmission obligations received by the licensee in like kind virtual currency.”).

2. The legislature should consider codifying established cryptocurrency with a large market cap, such as bitcoin, as an authorized investment for the State.²⁸¹
3. Texas should take necessary steps to make clear to the public that operating a Lightning Network node does not make a business or individual a money services business in Texas by either a Texas regulator public statement or by enacting legislation.
4. Texas should create a statutory definition of a fully U.S. dollar-backed audited stablecoin that has the status of “money” for all purposes, including, but not limited to, for permissible investments, under the Texas Money Services Act.
5. The Legislature should consider alerting and informing consumers to the risks associated with the different risk profiles related to different cryptocurrency lending models. The Texas state legislature should coordinate with the Texas Congressional Delegation to ensure that regulation at the federal level similarly differentiates between the risk profiles of these different business models.
6. The Work Group calls attention to the potential dangers of the creation of a retail Central Bank Digital Currency (“CBDC”)—e.g., a CBDC that involves a direct relationship between the Federal Reserve and consumers—in the United States, and encourages the Legislature to coordinate with the Texas Congressional Delegation to oppose such attempts.²⁸²

²⁸¹ TEX. GOV’T CODE § 404.024

²⁸² For an in-depth treatment of the dangers of Central Bank Digital Currencies, see Natalie Smolenski, *Why the U.S. Should Reject a Central Bank Digital Currencies (CBDCs)*, BITCOIN POL’Y INST. (Sept. 2022), https://uploads-ssl.webflow.com/627aa615676bdd1d47ec97d4/63323238ea73aa551a769b5b_BPI%20CBDC%20Paper%20.pdf.

Government Use Cases

Introduction

Government and public sector organizations can use blockchain technology to protect data, streamline processes, and reduce fraud, waste, and abuse while simultaneously increasing constituent trust and public sector accountability. On a blockchain-based government model, individuals, businesses, and governments use a distributed ledger as a secure verification infrastructure that is protected using a combination of cryptography, consensus-based verification protocols, and open technical standards for data anchoring, storage, sharing, and verification. This structure eliminates risk on specific software, which can represent single points of failure, and inherently protects sensitive constituent and government data.

Background

The Work Group notes that existing law already encourages government use of next generation technology. In particular, Government Code § 2054.601 specifies that: “Each state agency and local government shall, in the administration of the agency or local government, consider using next generation technologies, *including cryptocurrency, blockchain technology*, robotic process automation, and artificial intelligence.”²⁸³ And indeed, the distributed ledger format can be leveraged to support an array of government and public sector applications. Blockchain use cases in government and the public sector potentially include:

- Asset tracking and data management;²⁸⁴
- Titling;
- Vital records and credentialing;
- Healthcare; and
- Procurement and contract management.

For the above blockchain applications to be effective, they should make use of evolving technical standards as reviewed in this report.

Key Issues for Growth in Texas

To evaluate the extent to which agencies felt equipped to adopt blockchain technology pursuant to their mandate in the Government Code, the Work Group on Blockchain reached out to both Texas

²⁸³ GOVT. CODE § 2054.601 (emphasis added).

²⁸⁴ Indeed, Work Group Recommendation 25, *supra* at page 8, which is elaborated below, relates to the adoption of a blockchain-based data management system for the UCC Financing Statement filing system.

State Government Agencies and Institutions of Higher Education to gauge their perspectives on the use of blockchain technology. Two methods of outreach were employed:

- The 2022 Information Resources Deployment Review (IRDR),²⁸⁵ and
- Interviewing State Government Agencies via survey questions and direct meetings.

1. IRDR Data

Texas Government Code § 2054.0965 requires the Information Resources Manager (“IRM”) of each Texas state agency and IHE to conduct an Information Resources Deployment Review (“IRDR”) every two years. The IRDR provides a review of the operational aspects of each agency’s IR deployment in support of the agency’s mission, goals, and objectives. In addition, it illustrates how the agency’s Information Resources (“IR”) deployment supports the state’s IR direction as described in the State Strategic Plan for Information Resources Management (“SSP”). Finally, the review provides confirmation by the agency of compliance with the state’s IR-related statutes, rules, and standards. The IRDR posed a specific question to agencies and institutions of higher education related to blockchain technology—namely, “Do you plan to use blockchain technology in the future?” In response to this question, eight agencies indicated they “might use” blockchain technology in the future, and one agency indicated they are “planning to use” blockchain technology in the future.

2. Interviews with State Government Agencies

To further understand how government entities might be leveraging blockchain technologies now and in the future, the Government subcommittee surveyed state agencies and institutions of higher education. The subcommittee received responses from 12 state agencies and one institution of higher education to the following questions:

- 1) How familiar is your agency’s leadership with blockchain technology or cryptocurrency?
- 2) Does your agency have any plans to explore uses for blockchain technology?
- 3) Does your agency have future strategic plans relating to the use of cryptocurrency?
- 4) If your agency is pursuing initiatives related to blockchain or cryptocurrency, have you encountered any issues (policy, operational, etc.) that hinder your ability to move forward with those initiatives?

To summarize, all of the government agencies were generally familiar with blockchain technology at a beginner or entry level, but did not have any current or future project initiatives to use the technology. The University of Texas Health Science Center at Houston is actively researching the

²⁸⁵ For more information, visit: <https://dir.texas.gov/strategic-planning-and-reporting/ir-dr-ir-cap>.

development of a patient-centric medical imaging application that leverages blockchain technology.

Special thanks to the Texas Department of Insurance (“TDI”), State Securities Board (“SSB”), Texas State Library and Archives Commission (“TSLAC”), Office of Consumer Credit Commission (“OCCC”), Health and Human Services (“HHSC”), Department of Banking (“DOB”), Comptroller of Public Accounts (“CPA”), Department of Motor Vehicles (“DMV”), Department of Information Resources (“DIR”), Office of the Attorney General (“OAG”), Texas Education Agency (“TEA”), Secretary of State (“SOS”), and the University of Texas Health Science Center at Houston.

Recommendations

In light of the IRDR data and the data collected from state agencies, the Work Group takes the position that as government and public sector organizations start to explore the use of blockchain technologies, the following recommendations should be considered:

1. The Legislature should direct state agencies with subject-matter expertise to develop best practices or guidance related to leveraging distributed ledger technology infrastructure and financial best practices.

Best practices could include, but are not limited to, defining blockchain benefits, use cases, contractual language, development of blockchain innovation/center of excellence, and education or curriculum development. The Work Group recommends, in particular, that the Legislature consider DIR for the development of infrastructure best practices, and the Finance Commission of Texas to develop financial best practices.

2. Direct the DIR to develop a decision model to assist agencies in deciding if distributed ledger technology is appropriate for infrastructure consideration.

Using a decision model to assist the use-case selection process can save time and focus efforts on use cases that provide the greatest value to the organization. The decision model should be guided by business needs and constraints. Use cases will vary in risk, complexity, and cost. Example questions to evaluate potential use cases might include: (1) Do we need a structured central repository? (2) Are multiple entities accessing the database? (3) Do we need to ensure trust? (4) Would centralized administration be inefficient? and (5) Can business rules be automated?

3. Establish an innovation center within DIR or an independent organization as a Private/Public partnership.

Building an ecosystem to accelerate blockchain technology in government will require innovation and collaboration between government and private industry. An innovation center, or center of excellence, provides an environment for government to learn and get hands on experience from

industry subject matter experts. DIR previously established two centers of excellence on cloud technology and artificial intelligence to assist agencies in exploring use cases and developing proof of concepts. A similar center of excellence for blockchain technology could help government entities learn about blockchain offerings and how to use the technology to improve service delivery to Texans.

Official Record Keeping Systems

Introduction

The majority of the public discourse surrounding blockchain technology focuses almost exclusively on blockchain technology as it relates to supporting virtual currencies. Indeed, just as blockchain technology has the potential to reinvent our understanding and use of currency, it has the potential to revolutionize ledger records. Blockchain technology has the potential to provide an immutable, secure, and efficient data management system. This potential has caused relevant stakeholders in the private and public sector to explore the use of this technology in official record keeping systems. The transparent nature of this technology makes it the perfect fit for use in the storage and administration of local government records, such as real property records and UCC records.

Background

1. Real Property Recording in Texas

While technological innovations have increased exponentially in recent times, the principles and practical application of real property law, which are rooted in centuries-old English common law, have changed little. As such, the system for recording and transferring ownership interests in real property in virtually every jurisdiction within the United States is paper-based. These paper records are stored with a centralized government actor (such as a county recorder's office). While this system has been largely effective, it is not without fault. Our current system of property records relies on records that were created before a standardized system was in place. These records may be vague, incomplete, or simply incorrect in their descriptions of certain property. Blockchain technology could potentially be used to address weaknesses in the common-law title process.

Part of the issue with the current paper-based system is the sheer complexity that real estate ownership and transactions involve. Countless individuals can have a property interest in a particular parcel of land. Beyond the surface rights, which may include easements, leases, liens, and mortgages, a particular parcel of property also has a number of other ownership interests. For example, mineral, water, and air rights can be severed from the interest in the land itself. Compounding this is that these interests may be transferred, divided, or subdivided. Of course, this assumes that a particular parcel of property is a singular location with fixed boundaries. This, however, is not always the case. The boundaries of real property may move over time. An earthquake or sinkhole may cause a property to disappear entirely.

Needless to say, authenticating and memorializing real property transactions can be complex by their very nature. With the rise of fraud and bad actors who seek to take advantage of these complexities and shortcomings in our current system, it becomes even more important to identify and close these loopholes to protect and preserve real property rights. Forged and fraudulent transactions can make it impossible for the true owner of real property to establish their ownership

rights. Reliance on fraudulent and erroneous transactions or even a good faith misinterpretation of title history lead not only to increased costs for the buyer and seller, but also for insurers and the public at large.

While the Legislature has not provided any specific directives about the application of technology to real property law or recordings specifically, the Legislature has made a clear statement about the role of importance of innovation for governmental entities and subdivisions. Section 2054.601 of the Texas Government Code provides: each state agency and local government shall, in the administration of the agency or local government, consider using next generation technologies, including cryptocurrency, blockchain technology, robotic process automation, and artificial intelligence.²⁸⁶

The potential benefits to blockchain technology and its application in Texas real property law are endless. Blockchain technology as the primary system of real property recording in Texas has the potential to reduce fraud by providing an unbreakable chain of title, increasing efficiency by reducing the burden of imaging paper copies and the associated costs that come with that, reducing or outright eliminating the risk for human error, and minimizing the complexity and number of parties who must be involved with the recording of a transaction.

Yet, perhaps there is a reason that real property law has remained largely unchanged over the past century. It is not lost on the Workgroup that there are potential challenges that will come with the implementation of blockchain technology. First, while blockchain can provide a mechanism to combine the act of conveyance and the act of providing notice (recordation) of the conveyance into one event, creating and implementing a blockchain system to convey ownership would require a comprehensive revision to the current system and laws. Before blockchain technology could be implemented, the legislature must learn how this technology works and understand how to use it. The same is true for the other stakeholders who will be utilizing blockchain on a day-to-day basis. As such, we suggest piloting blockchain-based systems as a redundancy-driven concept and used parallel to the current recording system as a backup record.

Second, to fully enable and regulate a blockchain land recording system, the Work Group recognizes that laws and the legacy recording system in Texas would need to be significantly updated. As such, the Work Group believes a pilot program would assist in identifying the legal impediments that must be modified to accommodate blockchain-based recordation and transfers of real property interests. Additionally, the Work Group recognizes that land records currently in physical document form would need to be digitized. The Work Group additionally understands that the recording system in some Texas counties remains very dated. Some counties have expressed an interest in moving toward an eRecording system rather than a blockchain-based system. For example, not all 254 counties accept eRecordings, nor does Texas law require county clerks to accept electronic recordings. With that, we expect that larger, more tech-forward counties would be the ideal counties to implement this pilot program.

²⁸⁶ TEX. GOV'T CODE § 2054.601.

2. Recording UCC-1 Filings²⁸⁷

UCC Article 9 (“Article 9”) governs security interests in personal property.²⁸⁸ When a lender contracts (via a security agreement²⁸⁹) with a debtor²⁹⁰ for a property interest in the debtor’s personal property contingent upon the nonpayment of a debt (a security interest),²⁹¹ the lender becomes a secured party.²⁹² The personal property attached²⁹³ to the security interest (the collateral)²⁹⁴ helps the secured lender mitigate risk of default on the loan by providing some incentive for repayment and supplying known value from which to recuperate (at least some of) the outstanding balance of the loan.²⁹⁵ If the debtor fails to pay, the creditor may take possession of the collateral, and liquidate it to satisfy the outstanding balance of the loan.²⁹⁶ Indeed, in most circumstances, the secured creditor can engage in this process of repossession and sale without turning to the judicial system for enforcement.²⁹⁷

But a debtor can offer the same personal property as collateral to multiple lenders. The ability of a secured creditor to protect its interest in any given collateral against other creditors²⁹⁸ depends on the ability of secured creditors to communicate the existence of their security interests to each other.²⁹⁹ This is the role of what is known in secured transactions as perfection.³⁰⁰ If a secured creditor takes the steps required by Article 9 to perfect its security interest, the security interest will not only be valid and enforceable against the debtor, but it will also be sufficient to fix the secured creditor’s place in line for access to collateral over other creditors should the debtor

²⁸⁷ Much of this discussion is reprinted from Reyes, *supra* note 11, with permission of the author.

²⁸⁸ U.C.C. § 9-109(a)(1) (AM. L. INST. & UNIF. L. COMM’N 2010) (“Except as otherwise provided in subsections (c) and (d), this article applies to: (1) a transaction, regardless of its form, that creates a security interest in personal property . . .”).

²⁸⁹ See U.C.C. § 9-102(a)(73)(A) (“‘Secured party’ means: (A) a person in whose favor a security interest is created or provided for under a security agreement, whether or not any obligation to be secured is outstanding. . .”).

²⁹⁰ See *id.* § 9-102(a)(28) (“‘Debtor’ means: (A) a person having an interest, other than a security interest or other lien, in the collateral, whether or not the person is an obligor; (B) a seller of accounts, chattel paper, payment intangibles, or promissory notes; or (C) a consignee.”).

²⁹¹ See *id.* § 1-201(b)(35) (“‘Security interest’ means an interest in personal property or fixtures which secures payment or performance of an obligation.”).

²⁹² See *supra* note 289

²⁹³ Note that to say a security interest has attached to particular personal property means that the debtor and creditor have met certain requirements that make the security interest valid and enforceable as between the debtor and creditor. U.C.C. § 9-203(a)–(b) (AM. L. INST. & UNIF. L. COMM’N 2010) (requirements of attachment).

²⁹⁴ See *id.* § 9-102(a)(12) (“‘Collateral’ means the property subject to a security interest or agricultural lien.”).

²⁹⁵ See U.C.C. § 9-615 (sale proceeds applied to outstanding balance of debt).

²⁹⁶ See *id.* § 9-615 (sale proceeds applied to outstanding balance of debt).

²⁹⁷ See CANDACE M. ZIERDT ET AL., *ESSENTIAL UCC CONCEPTS: A SURVEY OF COMMERCIAL TRANSACTIONS* 580-81 (2018) (“Article 9 is unique in American law in that it permits self-help. Consider what this means: a secured party can, after default, seize (or more likely, hire someone to seize) the collateral without going to court first.”).

²⁹⁸ See ROBERT E. SCOTT & GEORGE G. TRIANTIS, *FOUNDATIONS OF COMMERCIAL LAW* 268 (2006) (“Assuming a security interest is enforceable against the debtor, a secured creditor enjoys priority over the collateral if it perfects the security interest by taking one of the prescribed steps to publicize it.”).

²⁹⁹ See *id.* (“The priority of a secured creditor hinges on the time at which she publicizes her lien.”); Lynn LoPucki, *The Sparring Tool Filing System Disaster*, 68 OHIO ST. L.J. 281, 283 (2007) (“The function of the Article 9 filing system is to provide notice of prior security interests to those who consider taking subsequent ones (hereafter ‘searchers’).”).

³⁰⁰ See U.C.C. § 9-308(a) (AM. L. INST. & UNIF. L. COMM’N 2010) (detailing the requirements for perfection).

default.³⁰¹ Although Article 9 offers a variety of methods for perfection depending on the classification of the collateral, each of them seek put the world on notice that a security interest in that collateral may exist.³⁰² One such perfection method is filing a UCC Financing Statement with the office designated in the applicable state version of the UCC.³⁰³ Texas requires filing UCC Financing statements with the Office of the Secretary of State.³⁰⁴

For a variety of reasons, both historical and practical, the current UCC Financing Statement filing system routinely fails to provide actual notice that a security interest in a specific collateral may exist.³⁰⁵ As currently designed, on a nation-wide basis, the Article 9 filing system remains imprecise, difficult, and expensive to use because of at least the five following factors: (1) there is not just one filing system, but many; (2) search methods differ widely from one filing system to another; (3) searches can only be conducted on the index of the filing, which is limited to an index of the debtor's name; (4) changes to an individual debtor's name, restructuring of a corporate debtor, or use of a corporate trade name can cause complexity for a filing system based on name searches; and (5) complying with the intricate rules of lapse, continuation, and termination to ensure maintenance of a security interest until full repayment of the debt remains complicated.³⁰⁶ In other words, when a prospective lender searches the Article 9 filing system, they can never be sure the results obtained reflect the actual state of the filing records.³⁰⁷ Texas has the opportunity to be a leader in resolving these long-standing difficulties with the Article 9 filing system by using a smart contract based data management system for UCC Financing Statement filings.

Using a blockchain-based data management system for UCC Financing Statement filings would retain the same data that is currently required by the standard UCC-1 form, or via direct data entry, but would resolve several engrained problems that plague the current system. In particular, a blockchain-based UCC Financing Statement filing system could improve the existing system by: (1) enabling new search capability without imposing new indexing burdens on the Texas Secretary of State; (2) allow the identification of specific collateral by hash of a serial number or other unique identifier; (3) generate new fees for the filing office; and (4) offer debtors an optional opportunity to authorize filing statements via an electronic signature and thereby prevent the use of unauthorized filings for harassment.³⁰⁸

³⁰¹ Fixing a creditor's place in line over others is referred to as "priority." LYNN M. LOPUCKI ET AL., SECURED TRANSACTIONS: A SYSTEMS APPROACH 439 (8th ed. 2016) ("To say that one creditor has priority over another is to say that if the value of the collateral is sufficient to pay only one of them, the law requires that value be used to pay the one who has priority.").

³⁰² See, e.g., *id.* at 324 ("Both Article 9 and real estate recording statutes recognize possession of some kinds of collateral as a substitute for public notice filing."); *id.* at 329 ("Article 9 recognizes 'control' of some kinds of collateral as a substitute for filing.").

³⁰³ See LOPUCKI ET AL., *supra* note 301, at 281 (describing the Article 9 filing system as a mechanism for "communicating the existence of a lien from the holder to a person who is considering becoming a creditor of the same debtor").

³⁰⁴ See TEX. BUS. & COM. CODE ANN. § 9.501(a)(2) (West 2021).

³⁰⁵ Reyes, *supra* note 11.

³⁰⁶ *Id.*

³⁰⁷ *Id.*

³⁰⁸ For an elaboration of each of these potential benefits, see Reyes, *supra* note 11, at 1565-1576.

The Key Issues for Blockchain-Related Economic Growth in Texas

1. Real Property Records

Regardless of degree in which relevant public-sector stakeholders adopt blockchain technology, there exists an opportunity for growth and use of blockchain technology by those in the real estate industry's private sector, such as title insurance.

Currently, title insurers are required to maintain databases, or "title plants," of publicly recorded documents that may affect or title or rights in real property. These include indices and images of all instruments filed within a jurisdiction, and tax records, court records, maps, plats, prior abstracts, and prior attorney opinions. Under Texas law, a title plant must (1) be geographically arranged; (2) cover a period beginning not later than January 1, 1979, and be kept current; and (3) be adequate for use in insuring titles, as determined by the Texas Department of Insurance.³⁰⁹

If title plants were changed to a blockchain based system, this would assist title insurers in maintaining title plants. This would ultimately assist insurers in developing efficient, streamlined tools to utilize when researching real property records. These savings could ultimately be passed along to the consumer reducing the cost of real estate transactions within the state.

2. UCC-1 Filings

Texas is already poised as a leader in pushing the modernity of the UCC-1 filing system forward. For example, Texas already allows for filing UCC Financing Statements via direct data entry.³¹⁰ To maintain that leadership by adopting a smart contract UCC-1 filing system would, therefore, merely require adopting a blockchain-based data management system to serve as the back-end of the existing Secretary of State user interface.³¹¹ No change to existing law would be necessary to effectuate this, and the smart-contract based system could hold the filings of cryptocurrency and non-cryptocurrency businesses in the course of their commercial transaction. Further, to the extent that Texas considers adopting hits approach to managing its UCC-1 filing system, the Legislature might also consider eliminating paper filings altogether.³¹² Doing so, however, would require legislative change, whereas implementing a blockchain-based data management system on the backend of the secretary of state's website, would not.

Recommendations

In light of the above considerations, the Work Group makes the following recommendations:

1. Texas should encourage counties to consider piloting the integration of blockchain technologies in the existing land registry system and solicit an RFX (e.g., a Request for

³⁰⁹ TEX. INS. CODE § 2501.004.

³¹⁰ 1 TEX. ADMIN. CODE 95.101(6) (2021).

³¹¹ For sample code building such a blockchain-based data management system for UCC-1 filings, see Reyes, *supra* note 11, and lexon.digital/reyes.html.

³¹² It is worth noting here that several states already eliminated paper filings entirely—namely, Delaware, Montana, North Dakota, Colorado, and New Jersey. Reyes, *supra* note 11, at 1550.

Proposal (“RFP”) or a Request for Offer (“RFO”) on the use of blockchain technology to support storage of real property records.

2. To the extent that blockchain technology may lower costs and create efficiencies in real estate transactions and title research, Texas should encourage private actors such as title insurers to adopt new technologies.
3. Texas should consider whether to use a blockchain-based data-management system for UCC Financing Statements, and in connection with adopting such a system, should consider the elimination of paper filings.

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